

Gobt. of {1889} Madras.
MILITARY.

To
THE ADJUTANT-GENERAL,
&c., &c., &c.

Dated November, 22nd.

Issued

Recd.

Encl.

G.O., 22nd November 1889, No. 8094.

NOVEMBER.
Nos. 309-310.

Medals.

Pensioners, ex-Soldiers (not Pensioners), &c.—
Procedure to be followed in future for the re-
placement of medals lost by —, laid down by the
Government of India.

N^o 3493 d/7th December 1889

Received

(S) R.R.D.D.

S. Es.

for information

No. 310. ORDER THEREON, 22nd November 1889, No. 8094.

Communicated for the information of His Excellency the Commander-in-Chief and the Controller of Military Accounts, also to the departments of the Secretariat.

(True Extract.)

(Signed) A. KENNEY-HERBERT, Brigdr.-Genl.,
Secretary to Government.

To the Adjutant-General.

„ Controller of Military Accounts.
„ Judicial Department.
„ Revenue Department.
„ Public Works Department.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

Medals.

Read the following paper :—

No. 309. *From Colonel A. C. TOKER, C.B., Deputy Secretary to the Government of India, Military Department, to the Adjutant-General in India; dated Fort William, the 11th November 1889, No. 2712-B.*

Medals.

With reference to your letters marginally noted regarding the disposal of applications for the replacement of medals lost by pensioners, ex-soldiers (not pensioners), and others who are not serving in departments, I am directed to say, for the information of the Commander-in-Chief, that the Government of India have decided that such applications shall in future be investigated by Civil and Political officers, as was formerly done by Pension Paymasters. If the investigating officer is satisfied as to the circumstances attending the loss, he will refer to the Officer Commanding the regiment to which the claimant belonged, or, in cases of men who earned the decoration in regiments which have been disbanded, to the Military Department; and, on the claim being verified, he will forward an application in Army Form B-177 to the Controller of Military Accounts concerned for disposal. This application should be accompanied by a certificate in accordance with the form annexed, and the Treasury officer's receipt for the cost of the decoration should be attached.

2. The enclosures of your letter No. 3744-B, dated 26th September 1889, are herewith returned.

Certified that, after a careful investigation, I am satisfied that the decorations were lost in an accidental manner involving no culpability on the part of the loser.

Station _____

Dated _____

No. 2712-B.

Copy forwarded to the Secretary to the Government of Madras, Military Department.

(By Order.)

FORT WILLIAM,
11th November 1889.

(Signed) A. C. TOKER, Colonel,
Dy. Secy. to the Govt. of India.

Extraneous

FORMULÆ AND TABLES
FOR DETERMINING THE SCANTLINGS
OF
BEAMS AND JOISTS
OF ALL TIMBERS
FOR
ENGINEERING PURPOSES

FOR
FLOORS, ROOFS, BRIDGE-PLATFORMS, &c., WITH RULES AND ORIGINAL FORMULÆ
REGARDING THE MOST ECONOMICAL SPACING OF BEAMS FOR A DOUBLE OR
A TRIPLE FRAMED FLOOR, WITH TABLE FOR FACILITATING THE CALCULATION;
WITH ORIGINAL FORMULÆ AND REMARKS WHEN JOISTS SHOULD BE USED ONLY
INSTEAD OF BEAMS AND JOISTS, AND THE ADVANTAGES OF THE ONE OVER THE
OTHER; ALSO GIVING RULES AND ORIGINAL FORMULÆ FOR FINDING THE LOSS
SUSTAINED BY USING A SPACING DIFFERENT FROM THE MOST ECONOMICAL
SPACING, WITH OTHER INFORMATION, AND EXAMPLES IN THE DEFLECTION AND
STRENGTH FORMULÆ; AND THE APPLICABILITY OF THE TABLES AND FORMULÆ
TO THE DIFFERENT KINDS OF STRUCTURES. (MANY OF THE FORMULÆ ARE, IT
IS BELIEVED, ORIGINAL.)

BY
W. W. ROBERTSON,
BURMA PUBLIC WORKS DEPARTMENT.

APPENDIX
ON
INDIAN TIMBER TREES

BY
Colonel A. M. LANG, R.E.
RE-PRINTED BY PERMISSION.

RANGOON:
PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRINTING, BURMA.
1889.

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CONTENTS.

	Page.
Preface.	
General notation used in the text	1
Note on the different values of E_d and P_b assumed or used by different authorities	1
Formulae used in the construction of the tables	3
Description of the diagram showing the length of beams and load at which "deflection" and "strength formulae" give the same scantling	6
Table No. 1 of multiplier to be used to facilitate the calculations	7
Diagram showing the length of beams and load at which "deflection" and "strength formulae" give the same scantling for "Burma teak"	8
Diagram, blank forms to be issued for other timbers	9
Note on beams of circular section, with rules for finding co-efficients for different woods	10
"Note A," giving a full solution of the problem for the most economical spacing of beams for flat-roofs, floors, bridge platforms, &c., &c., when beams and joists are used, and when cross-beams, longitudinal beams, and joists are used; also when three different kinds of timber are employed with three different values per cubic foot, with examples worked out	14
Sketch to illustrate the meaning of $\frac{L \pm d}{d}$ and $\frac{l \pm s}{s}$, and corbelling to keep joists clear of walls	15
Table No. II, showing the most economical spacing for beams when beams and joists are used, with other multipliers to facilitate the calculation for different values of R and r	17
"Note B," giving a full solution of the problem when beams and joists are just as cheap as joists only, with a number of examples	18
"Note C," giving a full solution and rule for finding the loss sustained by not spacing the beams according to the economical arrangement, with examples	22
"Note D," giving a full solution of the problem showing the loss of timber by using joists only instead of using beams and joists, with examples	23
"Note E," showing the relative advantages of a floor with beams and joists and a floor with cross-beams, on top of which are longitudinal beams, and on the latter joists on which rest the flooring, with examples worked out	24
Table No. III, showing size of teak beams, both "strong enough" and "stiff enough," without waste of material	26
Explanation of the use of the table for finding the size of beams, &c., both "strong enough" and "stiff enough," and the application of the tables to different kinds of timber	28
Table No. IV, showing the weight per superficial foot teak planking of different thickness will support and the safe bearing length	30
Explanation of Table No. IV, showing its applicability to other timbers	32
List showing the want of uniformity in the size of scantlings in some well-known buildings in Burma	34
Note on the list showing the want of uniformity in the size of scantlings in some well-known buildings in Burma	37
Table No. V, giving detailed results of experiments on different classes of teak as carried out by Captain Baker	39
Table No. VI, properties of timber grown in Ceylon, &c., by Moodliar A. Mendis, and additional data from the experiments of Captain Fowke, R.E., Captain Mayne, R.E., and Moodliar A. Mendis	40
Table No. VII, weight and strength, &c., of timbers (principally European timbers)	41
Formulae to be used in the Tables for deflection of beams $\frac{L}{40}$	47
Examples for any other deflection	ib.
Table No. VIII, on the "deflection formulae" for all beams from 1 foot to 30 feet in length and for distributed weights varying from 10lbs. to 90,000lbs., giving the depth, breadth, sectional area, cubic contents, and breaking-weight of beams	49
Formulae to be used in the "Strength formulae tables" for the determination of scantlings of rectangular and uniform section factor of safety = 10	87
Table No. IX, on the "strength formulae" for beams from 1 foot to 30 feet in length and varying weights distributed. The table shows depth, breadth, sectional area, cubic contents, weight of beam, and deflection, and also the weight required to deflect the beam $\frac{L}{40}$	88
Table No. X, co-efficients for the Deflection Formulae Table No. VIII for finding the depth, breadth, weight, &c., of any timber and any ratio of depth to breadth of beam	99
Table No. XI, co-efficients for the "Strength Formulae" Table No. IX for finding the depth, breadth, &c., &c., for other timbers for engineering purposes and any ratio of depth to breadth	107

APPENDICES.

APPENDIX No. I ON "INDIAN TIMBER TREES."	
By Colonel A. M. Lang, R.E.	iii.
List of the principal trees in India	v.
Vernacular index to Indian trees	xiii.
APPENDIX No. II.	
"Extract from Part II, R.E. aide-memoire" on different kinds of flooring	xv.
Plate showing details of flooring boards (to face page XV).	

P R E F A C E.

THE object of this book is to assist the practical man to design floors, platforms, bridges, roofs, &c., to the greatest degree of economy and uniformity. The tables are universal in scope as regards engineering timbers, embracing all with values of E_d (co-efficient of deflection elasticity), ranging from 1,800 to 5,400, and with values of P_r (co-efficient of rupture) from 400 to 1,300.

The scantlings required for any design for a building of any kind of wood can be found by the simple multiplication of two numbers, and for any weight and any ratio of depth to breadth of beam.

The sectional area, cubic contents, weight, breaking-weight, and the factor of safety can likewise be found by the multiplication of two numbers.

In the tables of co-efficients for E_d and P_r the first column (name of timber with local synonyms) is left blank, to be filled in by the Engineers using the book, for some trees have four or five different values of E_d and P_r for the same tree. A reference to the appendix by Colonel A. M. Lang, R.E. (which he kindly allowed to be re-printed from his Article No. XL on "Indian Timber Trees" in the "Professional Paper on Indian Engineering," Volume I, Second Series, in 1872), it will be noticed the timber *Cedrus deodara* has three different values of E_d , namely, 3,565, 3,205, and 3,925, but the Punjab Government use 1,800, so it will be readily seen the difficulty of entering in the first column the names of the trees. The local names of the trees are also so various that it would require greater space to suit all requirement than could be spared.

The appendix by Colonel A. M. Lang will give all the most generally used local as well as the botanical names of trees for engineering purposes in India; Table No. VI gives a few for Ceylon, and Table No. VII gives English timbers with the reduced values of E_d and P_r .

In nearly all cases we need only consider what weight per superficial foot we wish the floor, roof, &c., to bear, and never mind the total weight, *i.e.*, if the weight over such floor, platform, &c., be equally distributed; thus, should we wish the floor to bear 30lbs. per superficial foot, and if the distance the beams are apart be 15 feet, we need only enter into the tables with the span= $\frac{30}{15}$ of 15 feet=4.5 feet; or should we wish 150lbs. per superficial foot, then enter with $\frac{150}{15} \times$ distance the beams are apart, and so on, for any amount per superficial foot we wish the floor to bear.

Rules will be found in Note A for the most economical spacing of beams according to the "deflection formulæ," with tables for determining what spacing to give in each case where joists are placed 1, 2, 3, and 4 feet apart.

Other information with numerous examples will be found throughout the book.

GENERAL NOTATION.

The following General Notation is here collected for ready use.

W = Total weight in lbs. distributed = $L s w$.

w = Weight per superficial foot.

s = Distance of main beams apart from centre to centre in feet.

D = Distance of joists apart from centre to centre in feet.

L = Length of beam between points of support in feet.

d = Depth of beam in inches.

b = Breadth of beam in inches.

R = Ratio of depth to breadth or $\frac{d}{b}$ in the main beams generally.

r = Ratio of depth to breadth, or $\frac{d}{b}$ in joists or secondary beams generally.

$E_a E_{a1} \&c.$ = A constant quantity derived from experiments made upon different kinds of wood, E_a being supposed to represent the elasticity of the timber, or its power to recover its original position after being deflected.

δ = The deflection at the centre in inches while the elasticity remains unimpaired.

$P_b P_{b1} P_{b2} \&c.$ = Co-efficient of rupture. A constant quantity, for woods of the same kind derived from experiments on beams to resist transverse strain.

n = Factor of safety.

v = Weight in lbs.

ERRATA.

Page 3, Equation II.—For “ $d = L^{\frac{2}{3}} s^{\frac{1}{3}} \left(\frac{25 w R}{E_d} \right)^{\frac{1}{3}} s^{\frac{1}{3}}$ ” read “ $d = L^{\frac{2}{3}} s^{\frac{1}{3}} \left(\frac{25 w R}{E_d} \right)^{\frac{1}{3}}$ ”

Page 15, Equation 5A2.—For “ $s = \pm \frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{6 (L \pm d) l R^{\frac{1}{3}}} \pm \sqrt{\frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{3 R^{\frac{1}{3}} (L \pm d)} + \left(\frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{6 (L \pm d) l R^{\frac{1}{3}}} \right)^2}$ ”
read “ $s = \mp \frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{6 (L \pm d) l R^{\frac{1}{3}}} \pm \sqrt{\frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{3 R^{\frac{1}{3}} (L \pm d)} + \left(\frac{L^{\frac{5}{3}} r^{\frac{1}{3}} d^{\frac{1}{3}}}{6 (L \pm d) l R^{\frac{1}{3}}} \right)^2}$ ”

Page 16, Equation 13A.—For “ $\left(\frac{C_1}{C_2} \right)^{\frac{1}{2}}$ ” substitute “ $\left(\frac{C_1}{C_2} \right)^{\frac{1}{4}}$ ”

Page 17, 3rd line of letter press.—For “ A refers to $\frac{L+d}{d}$ ” read “ a refers to $\frac{L+d}{d}$ ”

Page 20, line 16.—For “two large results” read “too large results.”

Page 21, line 10.—For “Then, quantity of timber in beams actually” read “Then, quantity of timber in beams and joists actually.”

Page 21, line 11.—For “ 26×5.697 ” read “Beams 26×5.697 .”

Page 21, line 14.—For “it will be -101×2.849 ” read “it will be $= 101 \times 2.849$.”

Page 21, last line.—For “In Note c, following a rigid rule” read “in Note c following, a rigid rule.”

Page 67.—For “Table No. V” read “Table No. VIII.”

Note on Values of E_d , Deflection Formulae.

EXPERIMENTS on the deflection and strength of beams show great discrepancies in wood of the same kind.

Of all the authorities consulted it appears that Pegu teak is the weakest of all the teaks. Many of the books simply put down that the value of E_d for teak is such a constant, but not stating from where the specimen was procured, and of course from such no definite conclusion can be drawn.

If we take also the wood deodar, the chief building timber used in the Punjab, then according to Rai Bahadur Kunhya Lal, M.I.C.E., late Executive Engineer, Public Works Department, Lahore (*vide* his article in "Indian Engineering," Volume I, No. 17 of 23rd April 1887), it appears that the Punjab Government, Public Works Department Circular No. 44, dated the 30th November 1887, orders that the value of E_d for deodar for calculation of timber for flat roofs shall be taken as 1,800.

Now from (the late) Ensign Peter Keay's book, "Scantling of Timbers for Roofs," edition of 1872, Table IV, giving a list of experiments carried out by Major Robertson and Captain Henderson at Murree in 1856, a mean of 40 results shows the value of E_d for deodar as 3,205 and P_b , or breaking-weight, as 517.

In the same book, Table V, a series of 20 results by Colonel A. Cunningham, R.E., made at Mooltan, shows the value of E_d for deodar as 3,925 and the value of P_b as 655.

Mr. Keay in his Table No. XXV of his book has evidently taken the mean of the above results, *i.e.*, value of E_d for deodar; Punjab as 3,565 and value of P_b as 586; or, as regard E_d , the value given by Mr. Keay; and in the 3rd Volume of the "Roorkee Treatise" is nearly double of that used by the Punjab Government.

Major W. H. Mackesy, B.G.C., F.A.S., A.I.C.E., Executive Engineer, in his article in No. LVII, Volume I of 1872, "Roorkee Professional Paper on Indian Engineering," takes the value of E_d for deodar as 2,500 and the breaking-weight as 500; and points out that the Murree experiments in 1856 before quoted gave E_d from 2,200 to 3,200, and that "Rankine" gives E_d for cedar of Lebanon (supposed to be the same tree as the deodar) at 486,000 which, reduced to the "Roorkee" E_d , = 1,125.

With regard to teak, which (it is believed) is a more generally used timber for engineering purposes than any other wood, several authorities will be found quoted in the annexed tables at end of book.

The values of E_d quoted by "Stone" in his book of "Formulae and Tables for Beams and Joists of Teak" are, when reduced to the "Roorkee" E_d —

"Stoney on Strains and Girders, &c."

"Longman and Co.," 1866. E_d for teak, when reduced to the "Roorkee" E_d = 5,590 lbs.

"Tredgold's Carpentry," by "Hurst," "Spon," 1871. Roorkee E_d for teak = 5,263 lbs.

"Scantling of Timbers for Roofs," by "Peter Keay," Headmaster, Thomason College, Roorkee, 1865, showing experiments by Baker (given in detail at end), E_d = 4,500.

"Boileau;" "Professional Paper on Indian Engineering. Paper on beams for flat roofs." E_d = 4,410.

Stone himself in his book uses 5,000 lbs. as the value of E_d , which is nearly a mean of the above.

The value of E_d and P_b used in the table here are 3,900 and 800. This is the value quoted by Lalla Ganga Ram, A.M.I.C.E., M.I.M.E., Executive Engineer, Public Works Department, Punjab, in his pamphlet of instructions with his slide rule.

The value, 3,900, for E_a of teak of Burma seems to be about a fair value from a close study of the several results quoted. Several of the authorities quoted give a less value for teak from Burma, and generally, where the value is higher, the place where it was procured from is not stated.

The African teak in all books is given as the strongest. This wood is probably the link between oak and teak called *Turtosa*, and called the African teak and African oak indifferently.

Mr. Bennett, Executive Engineer, Port Blair, in his experiments gives the value as 3,754 for Moulmein teak.

Formulae used in Constructing Tables.

BARLOW'S formulae, either in the 1827, 1845, or 1867 edition, when reduced to the Roorkee notation becomes

$$bd^3 = \frac{5 L^3 W}{8 E_a \delta} \dots\dots\dots \text{I,}$$

where L = length of beam in feet between points of support.

W = weight distributed in lbs.

E_a = a constant quantity derived from experiments made on different kinds of wood, E_a being supposed to represent the elasticity of the timber or the power to recover its original position after being deflected.

d = depth of beam in inches.

b = breadth of beam in inches.

δ = the deflection at the centre in inches while the elasticity of the beam remains uninjured.

According to nearly all writers on applied mechanics δ is made to = $\frac{1}{40}$ of an inch per foot, i.e., it will start from 0 at the end of beam, and at the centre will show $\frac{1}{40}$ of an inch per foot, counting from end to centre. It will therefore as L = feet = $\frac{L}{40}$,* as L is taken between the points of support.

In semi-beams, or cantilevers $\frac{L}{20}$ is only allowed where L = the length of the projecting beam.

Now instead of using the weight (W) distributed along the beam, if we take the weight per superficial foot in lbs. of flooring, flat-roofing, or bridge platform, &c., as the case may be, and making w represent this amount and s the distance in feet the beams are apart, and substituting $L s w$ for W and $\frac{L}{40}$ for δ and

$d = Rb$ where R represents the ratio of depth to breadth of beam or $\frac{d}{b}$, then the value will be for d , b , &c., as under:—

$$d = \sqrt[4]{\frac{25 L^3 s w R}{E}} = L^{\frac{3}{4}} s^{\frac{1}{4}} \left(\frac{25 w R}{E_a} \right)^{\frac{1}{4}} \dots\dots\dots \text{II,}$$

$$b = \sqrt[4]{\frac{25 L^3 s w}{E_a R^3}} = L^{\frac{3}{4}} s^{\frac{1}{4}} \left(\frac{25 w}{E_a R^3} \right)^{\frac{1}{4}} \dots\dots\dots \text{III,}$$

$\frac{bd}{144}$ or sectional area of beam in superficial feet.

$$= \frac{L^{\frac{3}{4}} s^{\frac{1}{4}}}{144} \left(\frac{25 w}{E_a R} \right)^{\frac{1}{4}} \dots\dots\dots \text{IV,}$$

and $\frac{Lbd}{144}$ or the cubic contents of the beam will be in cubic feet.

$$\frac{L^{\frac{3}{4}} s^{\frac{1}{4}}}{144} \left(\frac{25 w}{E_a R} \right)^{\frac{1}{4}} \dots\dots\dots \text{V,}$$

and if v = the weight of the beam per cubic foot, then

$$\frac{v Lbd}{144} = \frac{v L^{\frac{3}{4}} s^{\frac{1}{4}}}{144} \left(\frac{25 w}{E_a R} \right)^{\frac{1}{4}} \dots\dots\dots \text{VI.}$$

Formulae for breaking weight when reduced to the Roorkee P_b becomes

$$b d^2 = \frac{L W}{2 P_b} \dots\dots\dots \text{VII.}$$

* It should be observed that δ is in inches whereas L is in feet. In all cases the deflection is taken equal to $\frac{1}{480}$ of the total length between the points of support or, to show it in the above notation, it will equal $\frac{12L}{480} = \frac{L}{40}$.

Substituting Lsw for W and Rb for $=d$ as before and n for the factor of safety we get

$$d = \sqrt[3]{\frac{nL^2 sw R}{2P_b}} = L^{\frac{2}{3}} s^{\frac{1}{3}} \sqrt[3]{\frac{nw R}{2P_b}} \dots\dots\dots \text{VIII,}$$

$$b = \sqrt[3]{\frac{nL^2 s w}{2P_b R^2}} = L^{\frac{2}{3}} s^{\frac{1}{3}} \sqrt[3]{\frac{nw}{2P_b R^2}} \dots\dots\dots \text{IX,}$$

$$\frac{bd}{144} = \text{or sectional area in superficial feet} = \frac{L^{\frac{2}{3}}}{144} \left(\frac{nw}{2P_b} \right)^{\frac{2}{3}} \dots\dots\dots \text{X,}$$

$$\frac{Lbd}{144} = \text{cubic feet} = \frac{L^{\frac{2}{3}} s^{\frac{1}{3}}}{144} \left(\frac{nw}{2P_b} \right)^{\frac{2}{3}} \dots\dots\dots \text{XI,}$$

and weight of beam

$$\frac{vLbd}{144} = \frac{vL^{\frac{2}{3}} s^{\frac{1}{3}}}{144} \left(\frac{nw}{2P_b} \right)^{\frac{2}{3}} \dots\dots\dots \text{XII.}$$

To have a beam both strong enough and stiff enough, with the least amount of timber in it, if we divide Equation I by Equation VII and substituting the value Lsw for W , $Rb=d$, $\delta=\frac{L}{40}$ and n =the factor of safety, we get

$$d = \frac{50L P_b}{nE_d} \dots\dots\dots \text{XIII,}$$

$$b = \frac{n^3 E_d^2 w s}{5,000 P_b^3} \dots\dots\dots \text{XIV,}$$

$$\frac{bd}{144} \text{ or sectional area in superficial feet} = \frac{Ln^2 E_d w s}{14400 P_b^3} \dots\dots\dots \text{XV,}$$

$$\text{cubic contents in cubic feet} = \frac{Lbd}{144} = \frac{L^2 n^2 E_d w s}{14400 P_b^3} \dots\dots\dots \text{XVI.}$$

$$\text{Weight of beam in lbs.} = \frac{vLbd}{144} = \frac{vL^2 n^2 E_d w s}{14400 P_b^3} \dots\dots\dots \text{XVII.}$$

In the deflection formulæ if d_1 and b_1 equal depth and breadth of beam corresponding to any value E_{d_1} other than E_d given in Equations II, III, IV, V, and VI, and let r equal any other value

$$\text{Then } d_1 = d \left(\frac{E_d r}{E_{d_1} R} \right)^{\frac{1}{3}} \dots\dots\dots \text{XVIII,}$$

$$b_1 = b \left(\frac{E_d R^3}{E_{d_1} r^3} \right)^{\frac{1}{3}} \dots\dots\dots \text{XIX,}$$

d and b being the depth and breadth calculated and registered in table, and as $E_d=3,900$ and $R=\sqrt{2}$, the co-efficients for finding d_1 and b_1 for any other values of E_{d_1} and r will be

$$\text{Co-efficient for } d_1 = \left(\frac{3,900 r}{E_{d_1} \sqrt{2}} \right)^{\frac{1}{3}} \dots\dots\dots \text{XX.}$$

$$\text{Co-efficient for } b_1 = \left(\frac{3,900 \times 2 \sqrt{2}}{r^3 E_{d_1}} \right)^{\frac{1}{3}} \dots\dots\dots \text{XXI.}$$

$$\text{Co-efficient for } \frac{b_1 d_1}{144} \text{ or } \frac{Lb_1 d_1}{144} \text{ or } \frac{vLb_1 d_1}{144}, \text{ i.e., sectional area, cubic contents,}$$

or weight will equal—

$$\frac{E_d^{\frac{1}{3}} R^{\frac{1}{3}}}{E_{d_1}^{\frac{1}{3}} r^{\frac{1}{3}}} = \frac{3900 \times 2^{\frac{1}{3}}}{r^{\frac{1}{3}} E_{d_1}^{\frac{1}{3}}} \dots\dots\dots \text{XXII.}$$

The co-efficients for use in the strength formulæ will be

$$\text{Co-efficient for } d_1 = \left(\frac{r P_b}{R E_{d_1}} \right)^{\frac{1}{3}} = \frac{800^{\frac{1}{3}} r^{\frac{1}{3}}}{2^{\frac{1}{3}} P_b^{\frac{1}{3}}} \dots\dots\dots \text{XXIII.}$$

$$\text{Co-efficient for } b_1 = \frac{P_b^{\frac{1}{3}} R^{\frac{1}{3}}}{P_{b_1}^{\frac{1}{3}} r^{\frac{1}{3}}} = \frac{800^{\frac{1}{3}} 2^{\frac{1}{3}}}{P_{b_1}^{\frac{1}{3}} r^{\frac{1}{3}}} \dots\dots\dots \text{XXIV.}$$

Co-efficient for sectional area, cubic contents, and for weight of beam

$$= \frac{P_b^{\frac{1}{3}} R^{\frac{1}{3}}}{P_{b_1}^{\frac{1}{3}} r^{\frac{1}{3}}} = \frac{800^{\frac{1}{3}} 2^{\frac{1}{3}}}{P_{b_1}^{\frac{1}{3}} r^{\frac{1}{3}}} \dots\dots\dots \text{XXV.}$$

The co-efficients to find d_1 b_1 and $d_1 b_1$, &c., for any other value of E_{d_1} , P_{b_1} , in Equations XIII, XIV, XV, XVI, and XVII will be

$$\text{Co-efficient for finding } d_1: \\ = \frac{P_{b_1} E_d}{P_b E_{d_1}} = \frac{3,900 P_{b_1}}{800 E_d} \dots\dots\dots \text{XXVI.}$$

Co-efficient for finding b_1 —

$$= \frac{E_{d_1}^2 P_b^3}{E_d^2 P_{b_1}^3} = \frac{800^3 E_{d_1}^2}{3,900^3 P_{b_1}^3} \dots\dots\dots \text{XXVII.}$$

Co-efficient for finding the sectional area, cubic contents, and weight for any other value of E_{d_1} , P_{b_1} , the sectional area, cubic contents, and weight corresponding to E_d , P_b , being given.

$$\text{Co-efficient} = \frac{E_{d_1}^2 P_b}{E_d P_{b_1}^2} = \frac{800^2 P_b}{3,900 E_{d_1}^2} \dots\dots\dots \text{XXVIII.}$$

The value of d and b are given in table for $E_d=3,900$ $P_b=800$ and the above co-efficients, equations XXVI and XXVII, will probably be found useful for determining d_1 and b_1 for other values of E_{d_1} and P_{b_1} . The sectional area, cubic contents, and weight are *not* given in table.

In the deflection formulæ, Table VIII, we have a weight equal to 100lbs. per superficial foot which will deflect the beam $\frac{1}{20}$ of an inch per foot or $\frac{L}{40}$, but

in the strength formulæ, Table IX, it shows depth and breadth of beams, which will break if ten times the weight as shown in tables be placed upon them, the factor of safety used in the strength formulæ being taken as 10. Now suppose we wish to find what weight will break the beams as given in table, deflection formulæ, using the factor of safety 10, as has been done in Table IX.

Let x =the breaking-weight. Then from Equations II and VIII we get by inserting x in place of w in strength formulæ—

$$d = \frac{L^{\frac{2}{3}} n^{\frac{1}{3}} x^{\frac{1}{3}} R^{\frac{1}{3}} s^{\frac{1}{3}}}{2^{\frac{1}{3}} P_b^{\frac{1}{3}}} \text{ in Equation VIII and}$$

$$d = \frac{L^{\frac{2}{3}} 25^{\frac{1}{3}} w^{\frac{1}{3}} R^{\frac{1}{3}} s^{\frac{1}{3}}}{E_d^{\frac{1}{3}}} \text{ in Equation II.}$$

Equating these two equal quantities

$$\frac{L^{\frac{2}{3}} n^{\frac{1}{3}} x^{\frac{1}{3}} R^{\frac{1}{3}} s^{\frac{1}{3}}}{2^{\frac{1}{3}} P_b^{\frac{1}{3}}} = \frac{L^{\frac{2}{3}} 25^{\frac{1}{3}} w^{\frac{1}{3}} R^{\frac{1}{3}} s^{\frac{1}{3}}}{E_d^{\frac{1}{3}}}$$

$$x = \frac{L^{\frac{1}{3}}}{s^{\frac{1}{3}}} \times \frac{w^{\frac{1}{3}} 25^{\frac{1}{3}} 2 P_b}{n R^{\frac{1}{3}} E_d^{\frac{2}{3}}} \dots\dots\dots \text{XXIX}$$

which is the equation that has been used in calculating the breaking-weight of beams in the Table VIII of deflection formulæ, and to ascertain the breaking-weight per running foot of beam it is only necessary to multiply the above quantity by s , and for the total breaking-weight of beam in lbs. distributed, multiply the breaking-weight given in the table by $L s$, i.e., by the length of beam and the distance the beams are apart. Co-efficient for the last equation (XXIX) will be, for any other values of E_{d_1} , P_{b_1} and r ,

$$\frac{P_{b_1} R^{\frac{1}{3}} E_d^{\frac{2}{3}}}{P_b r^{\frac{1}{3}} E_{d_1}^{\frac{2}{3}}} \dots\dots\dots \text{XXX}$$

or for use in the deflection formulæ table

$$\frac{P_{b_1} 2^{\frac{1}{3}} 3,900^{\frac{1}{3}}}{r^{\frac{1}{3}} E_{d_1} 800} \dots\dots\dots \text{XXX.}$$

The co-efficient shown in the tables requires to be multiplied by P_b , the numbers shown being only

$$\frac{2^{\frac{1}{2}} 3,900^{\frac{1}{2}}}{r^{\frac{1}{2}} E_d 800}$$

E_d being given for all values from 1,800 to 5,400, embracing all the values of E_d as given by Colonel Lang, R.E., in his article No. XL of the professional papers on Indian Engineering of 1872 which gives a full description of Indian timbers fit for engineering purposes, r ranging from $\frac{1}{4}$ to 1, to 6 to 1.

By equating Equations II and VIII to find the value of n we get

$$n = \frac{25^{\frac{1}{2}} \times 2 \times P_b L^{\frac{1}{2}}}{E_d^{\frac{1}{2}} R^{\frac{1}{2}} w^{\frac{1}{2}} s^{\frac{1}{2}}} \dots \dots \dots \text{XXXII};$$

and if we divide this last equation by Equation XXIX we get

$$n = \frac{x}{w} \dots \dots \dots \text{XXXIII};$$

and as w in the table is taken = to 100, it is evident that when x is found, n will be found also.

Taking Equations II and VIII, and equating for the value of δ we get

$$\delta = \frac{5 L^{\frac{1}{2}} 2^{\frac{1}{2}} P_b^{\frac{1}{2}}}{8 s^{\frac{1}{2}} w^{\frac{1}{2}} R^{\frac{1}{2}} E_d^{\frac{1}{2}} n^{\frac{1}{2}}} \dots \dots \dots \text{XXXIV};$$

and co-efficients for δ for any other value of P_b , E_d and r , other than what has been used in calculating the tables will be

$$\frac{P_b^{\frac{1}{2}} R^{\frac{1}{2}} E_d^{\frac{1}{2}}}{P_b^{\frac{1}{2}} r^{\frac{1}{2}} E_d^{\frac{1}{2}}} \dots \dots \dots \text{XXXV}.$$

Again, by taking Equations II and VIII we get

$$s^{\frac{1}{2}} = \frac{L^{\frac{1}{2}} 25^{\frac{1}{2}} 2^{\frac{1}{2}} P_b^{\frac{1}{2}}}{w^{\frac{1}{2}} R^{\frac{1}{2}} n^{\frac{1}{2}} E_d^{\frac{1}{2}}}$$

$$\text{and } s = \frac{L \times 25^{\frac{1}{2}} 2^{\frac{1}{2}} P_b^{\frac{1}{2}}}{w R n^{\frac{1}{2}} E_d^{\frac{1}{2}}} \dots \dots \dots \text{XXXVI}.$$

This equation gives the points along the spans,* that the deflection and strength formulæ are equal to one another. In the tables for deflection and strength with $R = \sqrt{2}$, $w = 100$, $P_b = 800$, $n = 10$, and $E_d = 3,900$, it will become

$$\frac{L \times 25^{\frac{1}{2}} 2^{\frac{1}{2}} 800^{\frac{1}{2}}}{100 \sqrt{2} 10^{\frac{1}{2}} 3,900^{\frac{1}{2}}} = L \times 1.2207.$$

When $R = 1$ it will be $L \times 1.7263$, and by giving different values to R a series of lines may be drawn showing whether the deflection or strength formulæ gives the larger results.

Should it be wished to draw lines on the diagram for any other deflection other than $\frac{L}{40}$ and for any factor of safety, then

$$s = \frac{5^{\frac{1}{2}} L^{\frac{1}{2}} P_b^{\frac{1}{2}}}{2^{\frac{1}{2}} E_d^{\frac{1}{2}} \delta^{\frac{1}{2}} R w n^{\frac{1}{2}}} \dots \dots \dots \text{XXXVI}.$$

With this equation any deflection and factor of safety being inserted and the diagonal lines drawn on the diagram will show when the strength formulæ and deflection formulæ give the same scantlings.

The numbers underneath will be found a great help in drawing lines on the diagram for $\delta = \frac{L}{40}$ and factor of safety = 10—for other timbers with different

values of E_d and P_b to teak. First find the value of $\frac{P_b^{\frac{1}{2}}}{E_d^{\frac{1}{2}}}$ for the particular timber for which it is intended to use the diagram, multiply the number so found by the numbers below corresponding to R , then plot this off along the span at 10 feet length of beams, and a line drawn from the top left-hand corner of the diagram through that point will be the line required. A piece of thread

* See diagram, page 8.

held at the top left-hand corner, and stretched over the point would show whether the strength or deflection formulæ should be used. As an example taken from the diagram, with the diagonal lines corresponding to R for teak $E_d = 3,900$ $P_b = 800$, we have

$$\frac{P_b^{\frac{1}{2}}}{E_d^{\frac{1}{2}}} = \left(\frac{800}{3,900} \right)^{\frac{1}{2}} \times 800 = \left(\frac{8}{39} \right)^{\frac{1}{2}} \times 800 = 6.905.$$

Now suppose we wish to know for what weight distributed, the strength and deflection formulæ will be equal when, say, $R = 2$.

Then $6.905 \times 1.25 = 8.631$ and it will be noticed that the line for $R = 2$ falls at 8.6 along the spans at 10 feet length of beam.

In general it will be as well to multiply the above results by 2 or 3 and plot them on the line corresponding to 20 or 30 feet, which will as a rule give a more accurate line, it being longer.

$\frac{P_b^{\frac{1}{2}}}{E_d^{\frac{1}{2}}}$ to be multiplied by numbers below corresponding to R .

Table No. 1.

Depth Breadth or R.	Multiplier.	Depth Breadth or R.	Multiplier.	Depth Breadth or R.	Multiplier.	Depth Breadth or R.	Multiplier.
$\frac{1}{4}$	10.00	1.5	1.666	2.3	1.087	3.5	.7142
$\frac{1}{2}$	5.000	1.6	1.562	2.4	1.041	4.0	.6250
$\frac{3}{4}$	3.333	1.7	1.470	2.5	1.000	4.5	.5555
1.	2.500	1.8	1.388	2.6	.9615	5.0	.5000
1.1	2.272	1.9	1.316	2.7	.9259	5.5	.4545
1.2	2.083	2.0	1.250	2.8	.8928	6.0	.4166
1.3	1.924	2.1	1.190	2.9	.8620	...	...
1.4	1.785	2.2	1.136	3.0	.8333	...	...

(8)

DIAGRAM

Showing the Length of Beams and Load at which Deflection and Strength Formulae give the same Scantling (see Equation XXXVI).

BURMA TEAK.

$$E_d = 3900$$

$$\delta = \frac{L}{40}$$

$$P_b = 800$$

$$n = 10$$

Length of beam in feet.	Distance of beams apart centre to centre in feet.																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Weight distributed in lbs. = numbers below x 100.																														
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182	189	196	203	210
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208	216	224	232	240
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234	243	252	261	270
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
11	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286	297	308	319	330
12	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312	324	336	348	360
13	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351	364	377	390
14	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364	378	392	406	420
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390	405	420	435	450
16	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416	432	448	464	480
17	17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442	459	476	493	510
18	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468	486	504	522	540
19	19	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494	513	532	551	570
20	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600
21	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546	567	588	609	630
22	22	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572	594	616	638	660
23	23	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598	621	644	667	690
24	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624	648	672	696	720
25	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
26	26	52	78	104	130	156	182	208	234	260	286	312	338	364	390	416	442	468	494	520	546	572	598	624	650	676	702	728	754	780
27	27	54	81	108	135	162	189	216	243	270	297	324	351	378	405	432	459	486	513	540	567	594	621	648	675	702	729	756	783	810
28	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	588	616	644	672	700	728	756	784	812	840
29	29	58	87	116	145	174	203	232	261	290	319	348	377	406	435	464	493	522	551	580	609	638	667	696	725	754	783	812	841	870
30	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870	900

Directions for use.—If the intersection of the numbers representing the weight distributed and length of beam falls below the diagonal line corresponding to R, the deflection tables will give the largest results and, therefore, it should be used; if the numbers representing the weight distributed, &c., falls above the diagonal line corresponding to R then the strength formulae tables give the largest results.

For further information see text, as regards using this diagram for other timbers and other factors of safety and deflection.

This diagram is constructed for factor of safety = 10, and deflection = $\frac{L}{40}$.

(9)

DIAGRAM

Showing the Length of Beams and Weight distributed at which Deflection and Strength Formulae give the same Scantling (see Equation XXXVI).

$$E_d =$$

$$\delta =$$

$$P_b =$$

$$n =$$

Length of beams in feet.	Distance of beams apart centre to centre in feet.																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Weight distributed in lbs.=numbers below x 100.																													
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182	189	196	203	210
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208	216	224	232	240
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234	243	252	261	270
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
11	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286	297	308	319	330
12	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312	324	336	348	360
13	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351	364	377	390
14	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364	378	392	406	420
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390	405	420	435	450
16	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416	432	448	464	480
17	17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442	459	476	493	510
18	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468	486	504	522	540
19	19	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494	513	532	551	570
20	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600
21	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546	567	588	609	630
22	22	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572	594	616	638	660
23	23	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598	621	644	667	690
24	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624	648	672	696	720
25	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
26	26	52	78	104	130	156	182	208	234	260	286	312	338	364	390	416	442	468	494	520	546	572	598	624	650	676	702	728	754	780
27	27	54	81	108	135	162	189	216	243	270	297	324	351	378	405	432	459	486	513	540	567	594	621	648	675	702	729	756	783	810
28	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	588	616	644	672	700	728	756	784	812	840
29	29	58	87	116	145	174	203	232	261	290	319	348	377	406	435	464	493	522	551	580	609	638	667	696	725	754	783	812	841	870
30	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870	900

Note on Beams of Circular Section.

The general formulæ for the deflection of beams of any section when supported at both ends may be stated thus: for deflection

$$\delta = \frac{5}{48} \times \frac{1728 L^3 W}{8 \times 432 E_d I} \dots\dots\dots 1.$$

Where δ =the deflection in inches, W =load distributed in lbs., L =length of beam in feet, E_d =the Roorkee E_d , and I =the moment of inertia.

The formulæ is generally stated in English works as

$$\delta = \frac{n w l^3}{e I} \dots\dots\dots 2,$$

n being a factor depending on the mode of fixing the ends, the method of loading and the form of the cross section, whether a uniform cross section, uniform strength and depth, or uniform strength and breadth.

For the weight (W) uniformly distributed, and the beam of uniform section and supported at both ends, $n = \frac{5}{48}$, l in Equation 2 represents the length in inches if fixed at one end, half length if supported or fixed at both ends, I =the moment of inertia, e =the modulus of elasticity, which is equal to 432 times the Roorkee E_d .

The moment of inertia for a circle of radius= R is equal to $\frac{\pi R^4}{4}$ and if we insert this in Equation 1 above, and put $L s w$ =to W and $\delta = \frac{L}{40}$, we obtain

$$R = \sqrt[4]{\frac{25 L^3 s w}{3 E_{d_1} \pi}} \dots\dots\dots 3.$$

Now in Equation II of general formulæ we have for a rectangular beam

$$d = \sqrt[4]{\frac{25 L^3 s w R}{E_d}}$$

Where R in this Equation represents $\frac{\text{depth}}{\text{breadth}}$, or in the tables as calculated it=the $\sqrt{2}$, s =span, or distance the beams are apart centre to centre, W =100lbs. per superficial foot, E_d =3,900 for Burma teak.

Hence we have

$$\frac{R}{d} = \sqrt[4]{\frac{E_d}{3 E_{d_1} \pi \sqrt{2}}} \dots\dots\dots 4$$

and the diameter will=

$$2d \sqrt[4]{\frac{E_d}{3 E_{d_1} \pi \sqrt{2}}}$$

i.e., the co-efficient for finding the diameter is

$$2 \sqrt[4]{\frac{E_d}{3 E_{d_1} \pi \sqrt{2}}} \text{ and this co-efficient multiplied by the depth of beam as}$$

given in the table for Burma teak, corresponding to the weight distributed, will give the diameter, a round log must be to deflect only $\frac{L}{40}$.

The co-efficient for finding the girth of the log will be

$$2 \pi \sqrt[4]{\frac{E_d}{3 E_{d_1} \pi \sqrt{2}}} \dots\dots\dots 5,$$

and this co-efficient if multiplied by the depth of the beam as given in the tables

will give a log to deflect $\frac{L}{40}$ corresponding to the weight supported. This co-efficient, for convenience and to save space, is placed opposite the co-efficients for finding the breadth.

The sectional area, cubic contents, and weight of the beam will be found by multiplying the sectional area, cubic contents, and weight as given in the table, by this co-efficient.

$$\sqrt{\frac{\pi E_d R}{3 E_{d_1}}}$$

or

$$\sqrt{\frac{\pi 3900 \sqrt{2}}{3 E_{d_1}}} \dots\dots\dots 6.$$

The rule given in English works for the dimension of beams to resist transverse strains when the weight is uniformly distributed and supported at both

$$\text{ends, can be reduced to } \frac{18 P_b I}{n Y_o} = \frac{3 L^2 s w}{2} \dots\dots\dots 7.$$

Where P_b is the Roorkee P_b and is $\frac{1}{18}$ th of the modulus of rupture, as given by "Rankine" and other writers on the subject, I =the moment of inertia, n =a factor of safety, Y_o =distance of the neutral axis from weaker side of beam, L =length of beam in feet, s =distance of beams apart centre to centre in feet, and w =weight per superficial foot.

Hence we have from the above equation for a cylinder with radius= R

$$I = \frac{\pi R^4}{4} \text{ and } Y_o = R.$$

Then

$$R = \sqrt[3]{\frac{n L^2 s w}{3 P_{b_1} \pi}} \dots\dots\dots 8$$

and diameter of log=

$$= 2 \sqrt[3]{\frac{n L^2 s w}{3 P_{b_1} \pi}} \dots\dots\dots 9.$$

In Equation VIII of the general formulæ before given we have for a rectangular beam

$$d = \sqrt[3]{\frac{n L^2 s w R}{2 P_b}} \dots\dots\dots 10,$$

R in this case representing the ratio of $\frac{\text{depth}}{\text{breadth}}$ of beam, and in the tables as calculated = to $\sqrt{2}$ and $P_b = 800$, $n = 10$, and $w = 100$ lbs. per superficial foot. Hence we have from the last two equations 9 and 10.

$$\frac{\text{diameter of log}}{\text{depth of rectangular beam}} = 2 \sqrt[3]{\frac{2 P_b}{3 \sqrt{2} P_{b_1} \pi}} \text{ or}$$

diameter of a cylinder or log=

$$= d \times 2 \sqrt[3]{\frac{2 \times 800}{3 \sqrt{2} P_{b_1} \pi}} \dots\dots\dots 11.$$

Girth of a cylinder will be = to

$$d \times 2 \pi \sqrt[3]{\frac{2 \times 800}{3 \sqrt{2} P_{b_1} \pi}} \text{ or}$$

$$d \times 2 \sqrt[3]{\frac{2 \times 800 \pi}{3 \sqrt{2} P_{b_1}}} \dots\dots\dots 12.$$

This co-efficient is also placed opposite the line marked breadth as previously explained for the deflection co-efficients.

We have also the sectional area, cubic contents, and weight of a beam of circular section = to the beam of rectangular section, taken from the tables

"Strength formulæ," where $\frac{\text{depth}}{\text{breadth}} = \sqrt{2}$, $P_b = 800$ = to the sectional area, cubic contents or weight of the rectangular beam from the tables corresponding to the weight to be supported multiplied by the co-efficient.

$$\sqrt[3]{\frac{4P_b^2 \sqrt{2\pi}}{9P_b^2}} \text{ or}$$

$$\sqrt[3]{\frac{4 \times 800^2 \sqrt{2\pi}}{9P_b^2}} \dots\dots\dots 13.$$

From Equation 3 we have

$$R = \sqrt[4]{\frac{25L^3 s w}{3E_d \pi}}$$

and from Equation 8 we have

$$R = \sqrt[3]{\frac{nL^2 s w}{3P_b \pi}}$$

Let $x = w$ in the strength or latter formulæ, and then by solving the two equal quantities

$$\sqrt[3]{\frac{nL^2 s x}{3P_b \pi}} = \sqrt[4]{\frac{25L^3 s w}{3E_d \pi}}$$

we get

$$x = \frac{25^{\frac{3}{4}} 3^{\frac{1}{4}} L^{\frac{1}{4}} w^{\frac{3}{4}} P_b \pi^{\frac{1}{4}}}{E_d^{\frac{3}{4}} n^{\frac{1}{4}}} \dots\dots\dots 14.$$

This equation, if solved, would give the breaking-weight of any circular beam, not to exceed $\frac{L}{40}$ in deflection, but still a better method of arriving at the breaking-weight of beams of circular section can be found for all timbers by using co-efficients along with the tables.

Thus should E_d , P_b , and n_1 represent any other values of E_d , P_b and n other than teak,

Then we have, calling y the breaking-weight of any timber other than teak,

$$y = \frac{25^{\frac{3}{4}} 3^{\frac{1}{4}} L^{\frac{1}{4}} w^{\frac{3}{4}} P_b \pi^{\frac{1}{4}}}{E_d^{\frac{3}{4}} n_1^{\frac{1}{4}}} \dots\dots\dots 15.$$

We have also the value of the breaking-weight from Equation XXIX for a rectangular beam.

$$x = \frac{L^{\frac{1}{4}} w^{\frac{3}{4}} 25^{\frac{3}{4}} 2P_b}{s^{\frac{1}{4}} n R^{\frac{1}{4}} E_d^{\frac{3}{4}}} \dots\dots\dots 16;$$

and when putting E_d , P_b , n , and R = to the values calculated in the tables, namely, 3,900, 800, 10, and $\sqrt{2}$ respectively, we arrive at that

$$\frac{y}{x} = \frac{3^{\frac{1}{4}} P_b \pi^{\frac{1}{4}} 10^{\frac{1}{4}} 2^{\frac{1}{4}} 3,900^{\frac{3}{4}}}{2 \times 800 n_1 E_d^{\frac{3}{4}}} \\ = \text{when } n = n_1 \text{ i.e., for factor of safety} = 10 \\ \frac{y}{x} = 5,894 \times \frac{P_b}{E_d} \dots\dots\dots 17;$$

and for any value of n_1 it is evident that the result, if multiplied by $\frac{10}{n_1}$, will give the required breaking-weight for any value of n_1 .

As an example of the use of the above co-efficients we will suppose we have a timber to build with, the values of E_d have been found by experiment to be 2,500 and $P_b = 500$. These were the values that at one time have been assigned to *Cedrus deodara*; but the value of E_d is now only taken as 1,800 by order of the "Punjab Government," where this timber is principally used.

Example.—A beam of circular section, 10 feet long, has to support a weight of 1,000lbs. distributed and not to deflect more than $\frac{L}{40}$, i.e., $\frac{1}{40}$ th of an inch per foot of length; required the breaking-weight of the beam, factor of safety being taken as 10, $E_d = 2500$, and $P_b = 500$.

If we look at the 10-foot length of beams in the deflection formulæ and at the weight of 1,000lbs. distributed, we will find the breaking-weight of a rectangular beam given as 186.9 per superficial foot, and as this occurs under one foot apart of beams, the total breaking-weight of the beam of rectangular shape is $10 \times 1 \times 186.9 = 1,869$ lbs., allowing a factor of 10.

In the co-efficients belonging to the deflection formulæ tables under the heading cylinder and opposite the breaking-weight will be found the co-efficient .00166.

Then the breaking-weight of a beam of circular section, as in example $P_b = 500$, will be—

$$1,869 \times .00166 \times 500 = 1,557 \text{ lbs.}$$

From the same place where we took this co-efficient and the number 186.9lbs. we also get co-efficients, &c., which, by a simple multiplication of two numbers, give us the diameter, girth, area, contents, and weight: thus from table we get

Size of rectangular beam to support 1,000lbs. and to deflect only $\frac{L}{40} = 5.487$ " deep.

Sectional area = .1478.

Cubic contents = 1.478.

Weight in lbs. = 66.53.

Diameter of beam—

Circular section = $5.487 \times 1.169 = 6.414$ ".

Girth of beam = $5.487 \times 3.675 = 20.164$ ".

Sectional area—

Superficial feet = .1478

Cubic contents—

Cubic feet = .1478

Weight in lbs. = 66.53

$$\left. \begin{array}{l} \text{Superficial feet} = .1478 \\ \text{Cubic feet} = .1478 \\ \text{Weight in lbs.} = 66.53 \end{array} \right\} \times 1.520 \left\{ \begin{array}{l} = .2246 \\ = 2.246 \\ = 101.125 \end{array} \right.$$

There is a co-efficient called the "Reciprocal of depth;" this will probably be found handy for working the inverse problem: i.e., say a beam of circular shape is given, 6.414" in diameter, to find the weight the beam will support and only deflect $\frac{L}{40}$, &c., other data as before, $E_d = 2,500$, $P_b = 500$, length of beam 10 feet, &c.

Hence we have a rectangular beam from the tables = to $6.414 \times 8.548 = 5.487$ " in depth, and by looking along the 10-foot length of beams we find this correspond to 1,000lbs., and from which all other information regarding the beam is easily ascertained, all operations being reduced to a simple multiplication question of two numbers.

It will be near enough for the practical man to simply take one decimal point in the co-efficient.

In the above, in practice, we would simply take in the above example for finding the weight a 6.414" diameter log will support with a deflection of only $\frac{L}{40}$

$$6.5 \times .85 = 5.5"$$

and in looking in the tables for a 5.5" we would conclude that it will bear 1,100lbs. (roughly).

In this last paragraph we are no advocate of rough calculations, but for practical purposes 100lbs., or 10lbs. per foot of beam, is of no consequence, and in measuring a circular log, in practice such as mentioned, it would be taken as 6.5" and not 6.414".

We will close this explanation of logs of a circular shape with the remark that the tables will be found useful for theoretical purposes as well as practical, for testing beams when a greater accuracy than in practice is required.

NOTE A.

In designing a floor, flat roof, or bridge platform, &c., the first consideration should be which is the most economical spacing that can be given to the beams and joists. The spacing of the joists will be limited by the kind of flooring, whether Penang tiles and concrete, corrugated iron and concrete, boarding, or brick and concrete, or rather the spacing of joists apart must necessarily be regulated by the safe weight the flooring itself above the joists will bear.

The safe spacing the flooring will bear being determined upon, *i.e.*, the distance the joists may be put apart, there is then a certain spacing which may be given, *ceteris paribus*, to the main beams which will give the least amount of timber possible in the floor. Of course many cases in practice will occur where the most economical spacing of beams cannot be adhered to, that is, where door or window lintels would fall underneath a beam if designed to be the most economical flooring, but still there are by far the greater number of buildings where a great saving might be effected by following as closely as possible the most economical spacing of the beams.

In Equation V we have the cubic contents of a beam = to

$$\frac{L^3 s^3}{144 R^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}}$$

and the number of beams in the room will be, if l represent the length of the room

$$\frac{l+s}{s} \text{ or } \frac{l-s}{s}$$

i.e., the number of beams will depend upon whether it is decided to allow the joists to rest on wall-plates in the end walls, or to place beams nearly (say 3 inches from end walls) against end walls, on which the joist rest, saving the end walls intact, and only piercing the side walls of the room. Several houses are built in this manner, and it seems to have advantages over resting the ends of the joists on wall-plates which must necessarily go the whole breadth of the room.

Now, the total cubic contents of the timber in the room as

$$\frac{l \pm s}{s} = \text{the number of beams; will be—}$$

$$= (l \pm s) \frac{L^3}{144 R^3 s^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} \dots \dots \dots 1A^*$$

and as l = length of room and L = the breadth, if we divide the above by Ll , it will give the cubic contents per superficial foot of flooring =

$$= \left(\frac{l \pm s}{l} \right) \frac{L^3}{144 R^3 s^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} =$$

$$= \frac{1}{144} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} \frac{L^3}{R^3} \left\{ \frac{1}{s^3} \pm \frac{s^3}{l} \right\} \dots \dots \dots 2A.$$

Now as the length of the joists are equal to s , and calling the distance the joists are apart d , and writing in Equation 1A, s for L , d for s , r for R , and

$$\frac{L \pm d}{d} \text{ for } \frac{l \pm s}{s} \text{ we get}$$

$$\left(\frac{L \pm d}{d} \right) \frac{s^3 d^3}{144 r^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} =$$

the cubic contents of joists in one span of room, and the total quantity of timber, in joist in room of length l will be the above quantity multiplied by

$$\frac{l}{s} =$$

$$= (L \pm d) \frac{l s^3}{r^3 d^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} \dots \dots \dots 3A$$

and the total quantity of joists per superficial foot of flooring will be by dividing the above by Ll =

$$= \left(\frac{L \pm d}{L} \right) \frac{s^3}{144 r^3 d^3} \left(\frac{25 w}{E_d} \right)^{\frac{1}{2}} \dots \dots \dots 4A$$

*Equation 1A added to Equation 3A will give the total quantity of timber in room, &c.

SKETCH TO ILLUSTRATE THE MEANING

OF

$$\frac{L \pm d}{d} \text{ AND } \frac{L \pm s}{s}$$

IN

NOTE A.

Figure 1.

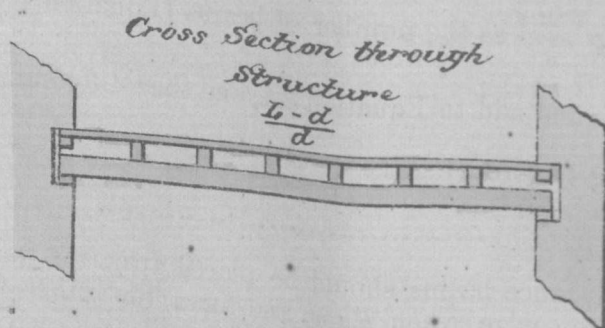


Figure 2.

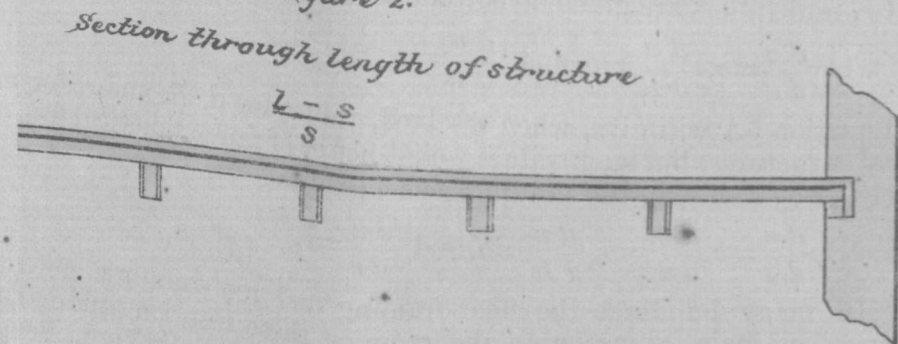


Figure 3.

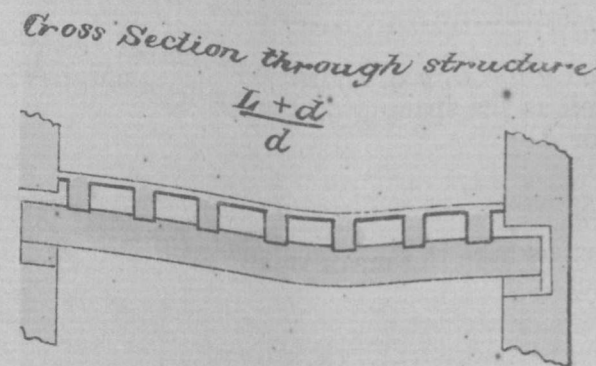


Figure 4.

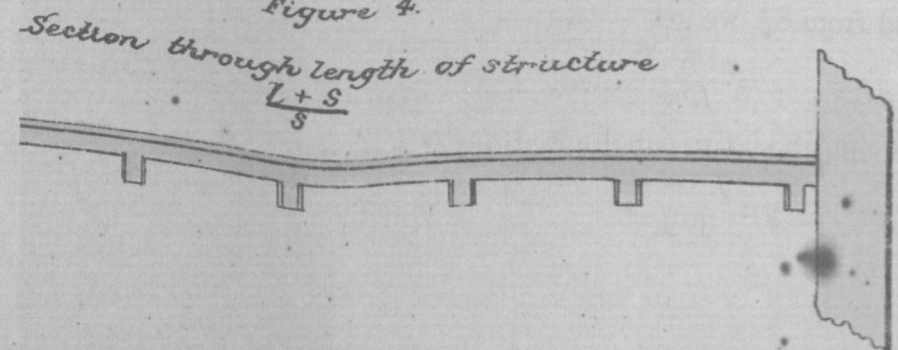
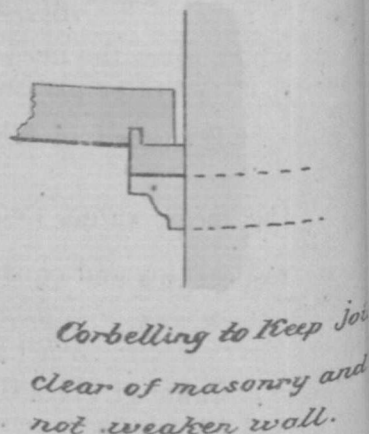


Figure 6



Hence total quantity of timber per superficial foot of flooring in great beams and joists=Equation 2A+Equation 4A or

$$u = \frac{1}{144} \left(\frac{25w}{E_d} \right)^{\frac{1}{2}} \left\{ \frac{L^{\frac{3}{2}}}{R^{\frac{1}{2}}} \left(\frac{1}{s^{\frac{1}{2}}} \pm \frac{s^{\frac{1}{2}}}{l} \right) + \left(\frac{L \pm d}{L} \right) \frac{s^{\frac{3}{2}}}{r^{\frac{1}{2}} d^{\frac{1}{2}}} \right\} \dots \dots \dots 5A$$

and differentiating with respect to s

$$\frac{d u}{d s} = \frac{1}{144} \left(\frac{25w}{E_d} \right)^{\frac{1}{2}} \left\{ \frac{L^{\frac{3}{2}}}{R^{\frac{1}{2}}} \left(-\frac{1}{2s^{\frac{3}{2}}} \pm \frac{1}{2s^{\frac{3}{2}}l} \right) + \left(\frac{L \pm d}{L} \right) \frac{3s^{\frac{1}{2}}}{2r^{\frac{1}{2}} d^{\frac{1}{2}}} \right\} = 0.$$

Multiplying by $s^{\frac{3}{2}}$ and transposing we get;

$$s = \pm \frac{L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{6(L \pm d) l R^{\frac{1}{2}}} \pm \sqrt{\frac{L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{3R^{\frac{1}{2}} (L \pm d)} + \left(\frac{L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{6(L \pm d) l R^{\frac{1}{2}}} \right)^2} \dots \dots 5A2$$

which gives the most economical spacing for the main beams of a floor, flat roof, or bridge platform, &c.

If instead of taking $\frac{l \pm s}{s}$ as the number of beams (Equation 1A) we take the mean value, i.e., $\frac{l}{s}$, and add to Equation 3A, and then differentiating with respect to s and equating to zero we get

$$s = \frac{L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}} (L \pm d)^{\frac{1}{2}}} \dots \dots \dots 6A$$

Table II gives the distance beams should be placed apart for joists 1, 2, 3, and 4 feet apart centre to centre when $R=r$, and for a few other ratios of R and r, multipliers are given at bottom of table.

$$\frac{d u}{d d} = 0, \frac{d u}{d R} = 0, \text{ and } \frac{d u}{d r} = 0,$$

in Equation 5A will give, when resolved, values for d, R, and r, for most economical structures, but such values would not be of much practical use, either separately, or by resolving the simultaneous equation

$$\frac{d u}{d s} = 0, \frac{d u}{d d} = 0, \frac{d u}{d R} = 0, \text{ and } \frac{d u}{d r} = 0.$$

In many buildings the floor-framing and roof-framing consists of three beams, i.e., main beams across the room on these rest longitudinal, and on the longitudinal beams rest joists upon which comes the planking, Penang tiles or bricks, &c., as the case may be.

Let us suppose that x=the spacing of the longitudinal beams and y=the spacing of the main or cross beams. Then first we have from Equation 6A

$$x = \frac{y^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}} (L \pm d)^{\frac{1}{2}}} \dots \dots \dots 7A$$

by substituting x for s and y for L, y of course representing the bearing of the longitudinal beams as well as the spacing of the main beams. And again we have by substituting x for d—

$$y = \frac{L^{\frac{3}{2}} r^{\frac{1}{2}} x^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}} (L \pm x)^{\frac{1}{2}}} \dots \dots \dots 8A.$$

In these equations let us take the mean value of $L+x$ and $L-x$. Then from 7A we get—

$$x = \frac{y^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}}} \dots \dots \dots 9A$$

and from 8A we get

$$x = \frac{y^{\frac{4}{3}} 3^{\frac{2}{3}} R}{L^{\frac{2}{3}} r} \dots \dots \dots 10A.$$

Solving these two equal quantities of x we get

$$y = \frac{L^{\frac{13}{18}} r^{\frac{1}{18}} d^{\frac{1}{18}}}{3^{\frac{13}{18}} R^{\frac{1}{18}}}$$

$$\text{or } y = \frac{L^{1\frac{1}{2}}}{3^{\frac{1}{2}}} \left(\frac{r}{R} \right)^{\frac{1}{2}} \times d \dots\dots\dots 11A.$$

This last equation being solved for y . x may be found from the tables sufficiently accurate enough for all practical purposes, or can be found independently from either Equation 9A or 10A.

Examples.—Suppose the width of a room to be 25 feet and it is proposed to have a triple frame floor, the joists over the longitudinal beams to be 1 foot apart and just as an example suppose $R=r$. Then by solving Equation 11A the spacing of the main beams (y) is found to be 8.383 feet apart and from either 9A or 10A we would get the spacing of the longitudinal beams = 2.844.

If we took this latter quantity from the tables, we would have to take 8 feet as being the nearest to 8.383. The length of bearing found by working out the equation, and 8 feet bearing with joists 1 foot apart, gives either 2.589 or 2.935, according to whether $\left(\frac{L+d}{d} \right)$ or $\frac{L-d}{d}$ is used.

So it will be readily seen that by using the table in the second case it will give results sufficiently accurate.

It will be also seen that the investigation given above of the most economical spacing of beams is based on the assumption that the timber in the main beams and in the joists are of the same quality or have the same value for E_d .

Cases may occur where, say, teak $E_d=3900$ is used in the main beams and deodar $E_d=1800$ in the joists, or *vice versa*, when the above formulæ will be altered to—

$$\text{Equation 6A to } s = \frac{L^{\frac{1}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}} (L \pm d)^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} \dots\dots\dots 12A.$$

Where E_{d_2} = the value of E_d corresponding to the quality of the timber put into the joists and E_{d_1} the value corresponding to the timber in the beams.

This last equation will only give the most economical spacing for the main beams where the cost of the timbers are the same per cubic foot; but should the cost of the timber in the beams be C , and in the joists C_2 per cubic foot, then the last equation would become—

$$s = \frac{L^{\frac{1}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}}}{3^{\frac{1}{2}} R^{\frac{1}{2}} (L \pm d)^{\frac{1}{2}}} \left(\frac{E_{d_2}}{E_{d_1}} \right)^{\frac{1}{2}} \left(\frac{C_2}{C_1} \right)^{\frac{1}{2}} \dots\dots\dots 13A$$

The use of timbers of different relative values as regards strength, deflection, and cost is often adopted.

For instance, in Burma it is very usual to put teak main beams and pyingado joists, and the relative value of the two woods is about 2 to 1 as regards price, but probably nearly similar practically* as regards strength and deflection.

In the case of a triple-framed floor, roof, or platform, &c., the solution of the problem for the spacing of the main or primary beams will be found from assuming the following data and solving the equation:—

Let E_d, R, C_1 = values for main or primary beams in structure of E_d , R , and cost.

Let E_d, R, C_2 = corresponding values for longitudinal beams.

Let E_d, R, C_3 = corresponding values for joists.

$$\text{Then } y = \frac{L^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} R_2^{\frac{1}{2}} E_{d_3}^{\frac{1}{2}} R_3^{\frac{1}{2}} C_3^{\frac{1}{2}}}{3^{\frac{1}{2}} R_1^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} C_1^{\frac{1}{2}} C_2^{\frac{1}{2}}} \dots\dots\dots 14A$$

* We have here said the value of E_d and P_b of teak and pyingado are practically equal.

The value of teak $\left\{ \begin{matrix} E_d = 3,900 \\ P_b = 800 \end{matrix} \right\}$ pyingado $\left\{ \begin{matrix} E_d = 4,283 \\ P_b = 836 \end{matrix} \right\}$

The difference of 383 in the value of E_d and of 36 in P_b would be of no moment for any practical purpose and the two would be considered equal as regards strength and deflection, but not so as regards value per cubic foot.

"All that a practical man is required to do is to get an approximation, for without some rule to go by as a guide he is quite liable to spend three times more on a roof than he should do, or else come to grief in the contrary extreme."

TABLE II.

Most economical Spacing of Beams when $R=r$,—see Equations, Note A.

Length of beams.	DISTANCE OF JOISTS APART.								Remarks.
	1 foot.		2 feet.		3 feet.		4 feet.		
	Distance beams ought to be placed apart.								
	a.	b.	a.	b.	a.	b.	a.	b.	
8	2.589	2.935	2.921	3.771	3.082	4.571	3.171	5.492	
9	2.846	3.181	3.227	4.045	3.419	4.835	3.530	5.692	
10	3.095	3.422	3.524	4.316	3.747	5.107	3.880	5.927	
11	3.338	3.657	3.814	4.585	4.068	5.381	4.223	6.182	
12	3.576	3.887	4.098	4.849	4.381	5.656	4.558	6.447	
13	3.808	4.113	4.376	5.109	4.689	5.930	4.888	6.717	
14	4.037	4.336	4.648	5.368	4.990	6.204	5.211	6.992	
15	4.260	4.555	4.915	5.621	5.286	6.474	5.529	7.267	
16	4.481	4.770	5.177	5.872	5.578	6.728	5.842	7.542	
17	4.697	4.982	5.438	6.119	5.864	7.009	6.150	7.817	
18	4.911	5.191	5.692	6.346	6.147	7.274	6.454	8.090	
19	5.121	5.398	5.943	6.606	6.426	7.535	6.753	8.363	
20	5.328	5.602	6.191	6.845	6.701	7.794	7.049	8.633	
21	5.533	5.763	6.435	7.080	6.972	8.050	7.340	8.902	
22	5.735	6.002	6.677	7.485	7.240	8.305	7.628	9.169	
23	5.936	6.199	6.916	7.545	7.505	8.557	7.914	9.434	
24	6.133	6.394	7.152	7.775	7.767	8.807	8.196	9.698	
25	6.329	6.587	7.386	8.002	8.026	9.055	8.476	9.959	

The letters a and b at the head of column refer to the way the joists are placed. Whether the number of joists are $\frac{L+d}{d}$ or $\frac{L-d}{d}$ see Equations IA, IIA, and IIIA, and figure 1 and figure 3. A refers to $\frac{L+d}{d}$, i.e., when a joist is put at each end of the girder or main beam. $\frac{L-d}{d}$ refers to the case where joists rest on wall-plates, and the wall-plates in this case are not taken into the calculation. The ratio of breadth to depth of beams and for joists is supposed to be the same in the above calculations.

For other ratios let R be the ratio or $\frac{d}{b}$ for the beams, and r the ratio or $\frac{d}{b}$ for joists.

When $R=\frac{3}{2}$ and $r=\frac{1}{2}$ multiply the numbers in the table by .904

When $R=\frac{3}{2}$ and $r=\frac{2}{3}$ multiply the numbers in the table by 1.074

When $R=\frac{3}{2}$ and $r=\frac{3}{2}$ multiply the numbers in the table by 1.189

When $R=\frac{2}{1}$ and $r=\frac{1}{2}$ multiply the numbers in the table by .841

When $R=\frac{2}{1}$ and $r=\frac{3}{2}$ multiply the numbers in the table by 1.107

When $R=\frac{2}{1}$ and $r=\frac{2}{3}$ multiply the numbers in the table by .931

and for any other value r and R multiply the figures in the table by $\left(\frac{r}{R} \right)^{\frac{1}{2}}$.

For other information see Equations, Note A.

There is a further correction due to the length of the room, but this will be in general such a small quantity that it will not matter, and in fact the whole table here given must be used in many cases as an approximation only.

For instance, should the room to be floored be 10 feet wide, it is evident that the joists cannot be 3 feet apart, as 3 is not a multiple of 10, and still the numbers are given in the table as 3.747 or 5.107 for the spacing of the beams, which is true, on the supposition that the joists are actually 3 feet apart.

Still as a practical formulæ it is deficient, for in the above calculations we have taken no account of the bearing of the timber on the wall, which will increase the beams and joists, and joists only in different proportions.

We will now only take the joists as $\frac{L+d}{d}$ and the beams as $\frac{l+s}{s}$, as the other quantity $\frac{L-d}{d}$ and $\frac{l-s}{s}$ is evidently defective, owing to the contents of the wallplates not being included in the account, and for which, it is believed, no definite rule regarding their size, &c., exists.

Suppose that the beams and joists in (A) and (C) before given each have a bearing of 1 foot then we have—

$$\begin{array}{l} \text{Quantity of timber in beams} \dots 11 \times 16 \times .7745 = 136.31 \\ \text{Quantity of timber in joists} \dots 15 \times 100 \times .1478 = 221.70 \\ \text{Total} \dots \underline{358.01} \end{array}$$

$$\text{Quantity of timber when joists only are used, } 101 \times 16 \times .2450 = 395.92$$

which means that there is a loss of 38 cubic feet of timber by putting in joists only; so this shows us that the formulæ gives two large results for practical purposes.

The cost of teak in Burma would be about Rs. 2 per cubic foot and the loss sustained would be about, say, Rs. 76.

Suppose we try 12 feet:

$$\begin{array}{l} \text{—beams} \dots 11 \times 14 \times .6146 = 94.64 \\ \text{—joists} \dots 13 \times 100 \times .1478 = 192.14 \\ \text{Total} \dots \underline{286.78 \text{ c. ft.}} \\ \text{—joists only} \dots 101 \times 14 \times .1943 = 274.7402 \end{array}$$

which shows a loss of nearly 14 cubic feet by using beams and joists or about 5 per cent. in wood.

Try 13 feet:

$$\begin{array}{l} \text{—beams} \dots 11 \times 15 \times .6930 = 114.35 \\ \text{—joists} \dots 14 \times 100 \times .1478 = 206.92 \\ \text{Total} \dots \underline{321.27 \text{ c. ft.}} \\ \text{—joists only, } 101 \times 15 \times .2191 = 331.9365 \text{ c. ft.} \end{array}$$

which shows a loss of about 10½ cubic feet by using joists or something like 3 per cent.

The correct answer is probably about 12' 6", that is, using beams and joists, or joists would be equal, when it is proposed to space the beams at 10 feet apart and joists at 1 foot apart, the beams to have a bearing of 1 foot on the walls in both cases.

At 12½ feet it would be—

$$\begin{array}{l} \text{beams, } 11 \times 14\frac{1}{2} \times .6538^* = 104.28 \\ \text{joists, } 13\frac{1}{2} \times 100 \times .1478 = 199.53 \\ \text{Total} \dots \underline{303.81} \\ \text{joists only, } 101 \times 14\frac{1}{2} \times .2067^* = 299.71 \end{array}$$

or a difference of 4 cubic feet in 300 or 1½ per cent.

We have assumed that the beams are to be placed 10 feet apart, but if we refer to Note A, Table II, we will find that for a 13-feet span the most economical spacing for the beams is (taking $\frac{L+d}{d}$) = to 3.808 feet, say, 4 feet,

as it will just go into the length of room assumed, namely, 100 feet.

Now if we put 4 feet as the spacing of beams in Equation 8B.,

i.e., $s = 4, d = 1$, we get—

$$L = \sqrt[3]{\frac{4^4}{4 - \sqrt[2]{4} + 1}} = \sqrt[3]{256} = 6.349.$$

* These quantities are arrived at by taking a mean between the sectional area of beams for 12 feet and 13 feet length, and are correct to third decimal place.

And from this result we may derive this conclusion, that all other things being equal, and where it is possible to use beams and joists, and space the beams according to Note A and Table II, it is cheaper to do so than to employ joists only.

As an example of the saving let us suppose the length of the room as before, i. e., 100 feet, beams spaced 4 feet apart (which is nearly the most economical arrangement when joists are one foot apart, vide Table II) and breadth of room 13 feet, the timber, teak, and ratio of depth to breadth $\sqrt{2}$ as before.

Then, quantity of timber in beams actually between points of support =

$$\begin{array}{l} 26 \times 5.697 = 148.12 \\ \text{joists} = 14 \times 100 \times .03740 = 52.36 \\ \text{Total} \dots \underline{200.48} \end{array}$$

If joists only are used, one foot apart, it will be $101 \times 2.849 = 287.75$.

The calculations for beams spaced 10 feet apart $d = 1$ and breadth of room 13 feet—

$$\begin{array}{l} \text{Beams } 11 \times 13 \times .6930 = 99.10 \\ \text{Joists } 14 \times 100 \times .1478 = 206.92 \\ \text{Total} \dots \underline{306.02} \end{array}$$

That is, by using beams and joists when spaced most economically the cubic contents in a 100 feet room = 200.48 cubic feet; when using joists only gives 287.75; and when the beams are spaced 10 feet apart, which is far from the most economical arrangement, the cubic contents = 306.02 cubic feet.

Or the first is to the last as 200.48 is to 306.02 or as the $\sqrt{4} : \sqrt{10}$ nearly, i. e., as the square root of the distance the beams are apart, and this rule will be nearly true as long as the span assumed is greater than that given for the most economical spacing, or calling s^1 span assumed and s the span, as given in Table II.

Then the excess will be shown by the two decimals after unity in the rule

$$\sqrt{\frac{s^1}{s}} \text{ nearly}$$

or, as in the present case just considered,

$$\sqrt{\frac{10}{4}} = \frac{3.16228}{2} = 1.581$$

or an excess of 58 per cent. nearly is caused by spacing the beams 10 feet apart instead of 4 feet, the most economical arrangement (nearly) for spacing beams in a room 13 feet wide.

If the spacing assumed, or s^1 , is less than the most economical spacing given, then the rule $\sqrt{\frac{s^1}{s}}$ will not hold good.

For, if we suppose, the beams placed 2 feet apart and joists 1 foot, other data as before, then quantity of timber—

$$\begin{array}{l} \text{Beams} = 51 \times 4.029 = 205.479 \\ \text{Joists} = 14 \times 100 \times .01322 = 18.508 \\ \text{Total} \dots \underline{223.987} \end{array}$$

which still shows an excess over the most economical spacing, but the formulæ $\sqrt{\frac{s^1}{s}}$ will not show the difference.

In Note C, following a rigid rule will be given for finding the loss sustained.

NOTE C.

In Note B we gave a practical rule for finding the loss of timber caused by any deviation from spacing the beams not according to the most economical arrangement as laid down in Note A. But the rule there given is only approximate when the spacing assumed is greater than that found from the formulæ in Note A and Table II attached. If the spacing is less, the formulæ fails entirely, so in this note we propose to give a rigid rule for finding the loss for all cases; but as the formulæ is rather complex when reduced to its simplest form, the one given in Note B will be found the handiest for all practical men, and will probably be near enough for all practical purposes, as the deviation from the best arranged spacing in most practical works is generally in excess of the most economical arrangement.

Suppose s_1 be the most economical spacing for the beams.

Suppose s be the spacing assumed (for any building whose length is l).

Then by assuming x = to the cubic contents of the timber in the floor, when the spacing = s_1 and y = the cubic contents of spacing s , we have from Equation 5A, Note A—

$$x = \frac{1}{144} \left(\frac{25w}{E_d} \right)^{\frac{1}{2}} \left\{ \frac{L^{\frac{3}{2}}}{R^{\frac{1}{2}}} \left[\frac{1}{s_1^{\frac{1}{2}}} \pm \frac{s_1^{\frac{1}{2}}}{l} \right] + \left[\frac{L \pm d}{L} \right] \frac{s_1^{\frac{3}{2}}}{r^{\frac{1}{2}} d^{\frac{1}{2}}} \right\} \dots\dots\dots 1.$$

$$y = \frac{1}{144} \left(\frac{25w}{E_d} \right)^{\frac{1}{2}} \left\{ \frac{L^{\frac{3}{2}}}{R^{\frac{1}{2}}} \left[\frac{1}{s^{\frac{1}{2}}} \pm \frac{s^{\frac{1}{2}}}{l} \right] + \left[\frac{L \pm d}{L} \right] \frac{s^{\frac{3}{2}}}{r^{\frac{1}{2}} d^{\frac{1}{2}}} \right\} \dots\dots\dots 2.$$

From the above we deduce when $R=r$ —

$$\frac{y}{x} = \left[\frac{s_1}{s} \right]^{\frac{1}{2}} \frac{\left\{ L^{\frac{3}{2}} d^{\frac{1}{2}} (l \pm s) + s^2 l (L \pm d) \right\}}{\left\{ L^{\frac{3}{2}} d^{\frac{1}{2}} (l \pm s_1) + s_1^2 l (L \pm d) \right\}} \dots\dots\dots 3.$$

Which equation will show the excess whether $s_1 > s$ or $s_1 < s$.

If we take the example given in Note B, namely, $L=13$, $s_1=4$ and $s=10$ and take $L+d$ and $L+s$ as we did in that example, the above would work out to $\frac{y}{x} = 1.492$, or a loss of 50 per cent. by using a 10 feet spacing for a 13 feet opening instead of using 4 feet.

In Note B we showed that by using the formulæ $\left[\frac{s_1}{s} \right]^{\frac{1}{2}}$ only the excess would show as 58 per cent. nearly, which shows how far the practical man can trust this formulæ, which is very handy.

In the above Note it will be observed we have supposed the same class of timber to be used both in joists and beams, and also that ratio of depth to breadth of both beams and joists remains the same in s_1 and s .

The correct equation will be, if a different ratio of depth to breadth is used in beams and joists—

$$\frac{y}{x} = \frac{s_1^{\frac{1}{2}}}{s^{\frac{1}{2}}} \frac{\left\{ L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}} (l \pm s) + s^2 R^{\frac{1}{2}} l (L \pm d) \right\}}{\left\{ L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}} (l \pm s_1) + s_1^2 R^{\frac{1}{2}} l (L \pm d) \right\}} \dots\dots\dots 4.$$

And suppose the timber in joists and beams to be of a different class and of a different cost per cubic foot;

Then—

$$\frac{y}{x} = \frac{s_1^{\frac{1}{2}}}{s^{\frac{1}{2}}} \frac{\left\{ C_1 L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} (l \pm s) + s^2 C_2 R^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} l (L \pm d) \right\}}{\left\{ C_1 L^{\frac{3}{2}} r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} (l \pm s_1) + s_1^2 C_2 R^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} l (L \pm d) \right\}} \dots\dots\dots 5.$$

NOTE D.

It might perhaps be interesting to find a formulæ to show the loss of timber when using joists only instead of beams and joists.

In examples in Note B we think it is partly conclusively proved that there is a loss, but at the same time the loss is not discernable. All we know is that it must be considerable.

If we take Equation 1B and 2B in Note B and calling them x and y respectively—

$$x = \frac{C_1 L^{\frac{3}{2}}}{144 R_1^{\frac{1}{2}}} \left(\frac{25w}{E_{d_1}} \right)^{\frac{1}{2}} \left\{ \frac{1}{s^{\frac{1}{2}}} \pm \frac{s^{\frac{1}{2}}}{l} \right\} + \left[\frac{L \pm d}{L} \right] \frac{s^{\frac{3}{2}}}{144 R_2^{\frac{1}{2}} d^{\frac{1}{2}}} \left(\frac{25w}{E_{d_2}} \right)^{\frac{1}{2}} C_2 \dots\dots\dots 1.$$

$$y = \frac{C_3 L^{\frac{3}{2}}}{144 R_3^{\frac{1}{2}}} \left(\frac{25w}{E_{d_3}} \right)^{\frac{1}{2}} \left\{ \frac{1}{d^{\frac{1}{2}}} \pm \frac{d^{\frac{1}{2}}}{l} \right\} \dots\dots\dots 2.$$

and when reduced—

$$\frac{y}{x} = \frac{C_3 L^{\frac{3}{2}} R_1^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} l s^{\frac{1}{2}} R_2^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} (l \pm d)}{R_3^{\frac{1}{2}} E_{d_3}^{\frac{1}{2}} d^{\frac{1}{2}} l \left\{ C_1 L^{\frac{3}{2}} R_2^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} (l \pm s) + s^2 C_2 R_1^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} l (L \pm d) \right\}} \dots\dots\dots 3.$$

Now should (as is most generally the case)

$$\begin{aligned} C_1 &= C_2 = C_3 \\ R_1 &= R_2 = R_3 \\ E_{d_1} &= E_{d_2} = E_{d_3} \text{ then} \end{aligned}$$

$$\frac{y}{x} = \frac{L^{\frac{3}{2}} l s^{\frac{1}{2}} d^{\frac{1}{2}} (l \pm d)}{d^{\frac{1}{2}} l \left\{ L^{\frac{3}{2}} d^{\frac{1}{2}} (l \pm s) + s^2 l (L \pm d) \right\}} \text{ or}$$

$$\frac{y}{x} = \frac{L^{\frac{3}{2}} l s^{\frac{1}{2}} d^{\frac{1}{2}} (l \pm d)}{L^{\frac{3}{2}} d^{\frac{1}{2}} l (l \pm s) + s^2 d^{\frac{1}{2}} l^2 (L \pm d)} \dots\dots\dots 4.$$

If we take the example given in Note B to test the accuracy of the above formulæ, we have when the room is 13 feet wide (L), and distance beams are apart = 4 feet (nearly the best arrangement) (s), and length of room 100 feet (l), and the distance the joists are apart = 1 foot = d , and taking $l+s$ and $L+d$ as done in example, we have then—

$$\frac{y}{x} = \frac{13^{\frac{3}{2}} \cdot 100 \cdot 4^{\frac{1}{2}} \cdot 1^{\frac{1}{2}} (101)}{13^{\frac{3}{2}} \cdot 1 \cdot 100 (104) + 4^2 \cdot 1^{\frac{1}{2}} \cdot 100^2 (101)} =$$

when worked out by logarithms, 1.435.

The quantities, as calculated in example in Note B—

for beams and joists, 200.48 cubic feet;

for joists only, 287.75 cubic feet,

which shows that in this case there is a loss of 43½ per cent. by using joists only instead of using beams and joists.

The agreement of the above two results, which have been arrived at by two independent methods, proves the formulæ as given above to be correct.

NOTE E.

In this note we propose to consider the relative advantages of a floor, bridge platform, flat roof, &c., &c., constructed with beams and joists, and a triple framed structure, namely, cross beams, on top of which is placed longitudinal beams, and over these the joists, upon which the flooring, &c., is laid.

Let $E_{d_1} R_1 C_1$ be the value of $E_{d_1} \frac{\text{depth}}{\text{breadth}}$ and cost per cubic foot of timber in beams, when beams and joists are used.

Let $E_{d_2} R_2 C_2$ be the value of timber in joists when beams and joists are used.

Let $E_{d_3} R_3 C_3$ be the value of cross beams or primary beams in a triple framed floor, platform, &c.

Let $E_{d_4} R_4 C_4$ be the value of the longitudinal beams in triple framed structure.

Let $E_{d_5} R_5 C_5$ be the value of the joists in a triple framed structure.

We have from Equation 1B, Note B, the quantity of timber in beams and joists =

$$= \frac{C_1 L^3}{144 R_1^3} \left(\frac{25w}{E_{d_1}} \right)^{\frac{1}{2}} \left\{ \frac{1}{s^3} \pm \frac{s^3}{l} \right\} + \frac{(L \pm d)s^3}{144 L R_2^3 d^3} \left(\frac{25w}{E_{d_2}} \right)^{\frac{1}{2}} C_2$$

which call = to m .

Now d will still retain its same value whether the floor, platform, &c., be a double or a triple framed structure, *i.e.*, the kind of flooring to be the same in both class of floor, then the distance the joists are to be put apart will be a constant. But if we call y = to s and x = to the distance the longitudinal beams are placed apart, as we did in Note A, Equation 7A, then we have the quantity of timber per superficial foot of flooring, platform, flat roof, &c., = to—

in main cross beams by Equation 2A—

$$\frac{C_3}{144} \left(\frac{25w}{E_{d_3}} \right)^{\frac{1}{2}} \frac{L^3}{R_3^3} \left\{ \frac{1}{y^3} \pm \frac{y^3}{l} \right\} \dots\dots\dots 2E;$$

in longitudinal beams from 4A, by substituting x for d and y for s

$$\frac{(L \pm x)y^3 C_4}{144 L R_4^3 x^3} \left(\frac{25w}{E_{d_4}} \right)^{\frac{1}{2}} \dots\dots\dots 3E;$$

and the cubic contents of the timber in the joists will be by substituting x for s and $\frac{l \pm d}{d}$ for $\frac{L \pm d}{d}$ in Equation 4A, Note A,

$$\frac{C_5(l \pm d)x^3}{144 R_5^3 d^3} \left(\frac{25w}{E_{d_5}} \right)^{\frac{1}{2}} \dots\dots\dots 4E.$$

Now calling the expression

$$2E + 3E + 4E = \text{to } n$$

we have $\frac{m}{n} = \text{to}$

$$\frac{\sqrt{R_3 R_4 R_5 E_{d_3} E_{d_4} E_{d_5}} y x d \{ C_1 \sqrt{L^5 R_2 E_{d_2} d L \pm s} + \sqrt{R_1 R_2 E_{d_1} E_{d_2} s d} \{ C_3 \sqrt{L^5 R_4 E_{d_4} R_5 E_{d_5} x d} (l \pm y) + C_2 s^2 l \sqrt{R_1 E_{d_1} (L \pm d)} \} \dots\dots\dots 5E.$$

The above will give the relative values when there are five different kinds of wood used in the construction, and five different ratios of depth to breadth, and the timbers used have five different rates per cubic foot, or it is correct for any number of different kinds less than five, by inserting the proper arithmetical values in the equation.

Now, if we suppose that only one class of timber is used, the ratio of depth to breadth is the same throughout, and also the rate per cubic foot, *i.e.*, all R 's, are equal to one another, also the E 's and C 's, then the equation reduces down to—

$$\frac{\sqrt{y x d} \{ \sqrt{L^5 d (l \pm s)} + s^2 l (L \pm d) \}}{\sqrt{s d} \{ \sqrt{L^5 x d (l \pm y)} + y^2 l \sqrt{d} (L \pm x) + x^2 L \sqrt{y} (l \pm d) \}} \dots\dots\dots 6E.$$

If we take an example of a triple framed structure—24 feet breadth of room, 96 feet long, $R=r$, &c., we find that the most economical spacing for such a building, for the main beams from Equation IIA = $\sqrt[13]{\frac{L^3 d}{3^{10}}} = 8.073$, say

8 feet, where $d=1$ foot. For the longitudinal beams with a bearing of 8 feet we get from the table to be = to 2.8 feet nearly, when we consider $\left(\frac{l \pm d}{d} \right)$

and that $l=96$ feet $d=1$ foot, and when beams and joists only are used we have for a 24-foot room when $d=1$ $s=6$ feet nearly—

$$\text{or } \frac{m}{n} = \frac{\sqrt{8 \times 2.7} \{ 24^3 \times 102 + 36 \times 96(25) \}}{\sqrt{6} \{ 24^3 \times 2.7^3(104) + 64 \times 96 \times 26.7 + (2.7)^2 \times 24 \sqrt{8 \times 97} \}}.$$

By calculating the above by logs we get $\frac{m}{n} = 1.022$.

If we take the quantities from the tables we have for beams and joists in a 96 feet length of room 24 feet wide, s , or distance apart of beams, = 6 feet, and d , or distance of joists apart, = 1 foot, number of beams will be 17, taking $(l+s)$

17 beams for 24 feet bearing to carry 100 per superficial foot, distance apart = 6 feet = $17 \times 32.31 =$	549.27
25 joists, span 1 foot apart = to $25 \times 96 \times .06871$ for 6-feet bearing =	164.90
Total	714.17

For a triple framed floor—

Main cross beams, 8 feet apart, 13 in number = $13 \times 37.31 =$	485.03
Longitudinal beams 2.7 feet apart (nearly), 10 in number, bearing 8 feet = $10 \times 96 \times .173 =$	166.08
Joists, 2.7 feet, bearing = to $97 \times 24 \times .021 =$	48.888
Total	699.998

Hence we have $\frac{m}{n}$ for these last two results = $\frac{714.17}{699.998} = 1.02$, which shows

conclusively that the formulæ is to be depended upon.

The difference of 2 per cent. between a double framed and a triple framed floor may appear to most practical men not worth any consideration; but it must be observed that in the example worked out we have taken the most economical spacing in both cases, and that the further deviation from this spacing the more will the saving be by employing the triple framed floor.

If we put m = to n , or, what is the same thing, Equation 1E = to Equations 2E + 3E + 4E, and solving for the value of L , and considering $L \pm d$ and $L \pm x$ = to L the mean values, and assuming the class of timber to be the same throughout, then we get—

$$L = \sqrt[3]{\frac{s^3 \{ y^2 l d + x^2 y^3 d^3 (l \pm d) \} + s^2 l y^3 x^3 d^3}{x^3 d \{ y^3 (l \pm s) - s^3 (l \pm y) \}}}$$

and by assuming the mean values of $l \pm d$, $l \pm s$, and $l \pm y$ the equation becomes

$$L = \sqrt[3]{\frac{(s^3 y^2 d + x^3 y^3 d^3) + s^2 y^3 x^3 d^3}{x^3 d (y^3 - s^3)}}$$

which gives the length of bearing of the main beams, so that it will be just as cheap to put in a double as a triple framed floor, the same class of timber being used in both, and the same ratios of depth to breadth being adhered to in both cases for both beams and joists.

TABLE
Showing size of Beams both strong enough and
BURMA TEAK.
Factor of safety = 10.

Length of beams.	Depth of beams.	Distance of beams.													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Breadth of													
		59413	118826	178239	237652	297065	356478	415891	475304	534717	594130	653543	712956	772369	831782
		Weight.													
1	1'0256	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400
2	2'0512	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
3	3'0768	300	600	900	1200	1500	1800	2100	2400	2700	3000	3300	3600	3900	4200
4	4'1024	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600
5	5'1280	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
6	6'1536	600	1200	1800	2400	3000	3600	4200	4800	5400	6000	6600	7200	7800	8400
7	7'1792	700	1400	2100	2800	3500	4200	4900	5600	6300	7000	7700	8400	9100	9800
8	8'2048	800	1600	2400	3200	4000	4800	5600	6400	7200	8000	8800	9600	10400	11200
9	9'2304	900	1800	2700	3600	4500	5400	6300	7200	8100	9000	9900	10800	11700	12600
10	10'2560	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000
11	11'2816	1100	2200	3300	4400	5500	6600	7700	8800	9900	11000	12100	13200	14300	15400
12	12'3072	1200	2400	3600	4800	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800
13	13'3328	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000	14300	15600	16900	18200
14	14'3584	1400	2800	4200	5600	7000	8400	9800	11200	12600	14000	15400	16800	18200	19600
15	15'3840	1500	3000	4500	6000	7500	9000	10500	12000	13500	15000	16500	18000	19500	21000
16	16'4096	1600	3200	4800	6400	8000	9600	11200	12800	14400	16000	17600	19200	20800	22400
17	17'4352	1700	3400	5100	6800	8500	10200	11900	13600	15300	17000	18700	20400	22100	23800
18	18'4608	1800	3600	5400	7200	9000	10800	12600	14400	16200	18000	19800	21600	23400	25200
19	19'4864	1900	3800	5700	7600	9500	11400	13300	15200	17100	19000	20900	22800	24700	26600
20	20'5120	2000	4000	6000	8000	10000	12000	14000	16000	18000	20000	22000	24000	26000	28000
21	21'5376	2100	4200	6300	8400	10500	12600	14700	16800	18900	21000	23100	25200	27300	29400
22	22'5632	2200	4400	6600	8800	11000	13200	15400	17600	19800	22000	24200	26400	28600	30800
23	23'5888	2300	4600	6900	9200	11500	13800	16100	18400	20700	23000	25300	27600	29900	32200
24	24'6144	2400	4800	7200	9600	12000	14400	16800	19200	21600	24000	26400	28800	31200	33600
25	25'6400	2500	5000	7500	10000	12500	15000	17500	20000	22500	25000	27500	30000	32500	35000
26	26'6656	2600	5200	7800	10400	13000	15600	18200	20800	23400	26000	28600	31200	33800	36400
27	27'6912	2700	5400	8100	10800	13500	16200	18900	21600	24300	27000	29700	32400	35100	37800
28	28'7168	2800	5600	8400	11200	14000	16800	19600	22400	25200	28000	30800	33600	36400	39200
29	29'7424	2900	5800	8700	11600	14500	17400	20300	23200	26100	29000	31900	34800	37700	40600
30	30'7680	3000	6000	9000	12000	15000	18000	21000	24000	27000	30000	33000	36000	39000	42000

For other timber, with different values of E_d , P_b , n and δ

No. III.

stiff enough without Waste of Material.

$$E_d = 3900$$

$$P_b = 800$$

$$\text{and deflection or } \delta = \frac{L}{40}$$

Apart centre to centre.															
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Beams.															
8'91195	9'50608	10'10021	10'69434	11'28847	11'88260	12'47673	13'07086	13'66499	14'25912	14'85325	15'44738	16'04151	16'63564	17'22977	17'82390
Distributed.															
1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
3000	3200	3400	3600	3800	4000	4200	4400	4600	4800	5000	5200	5400	5600	5800	6000
4500	4800	5100	5400	5700	6000	6300	6600	6900	7200	7500	7800	8100	8400	8700	9000
6000	6400	6800	7200	7600	8000	8400	8800	9200	9600	10000	10400	10800	11200	11600	12000
7500	8000	8500	9000	9500	10000	10500	11000	11500	12000	12500	13000	13500	14000	14500	15000
9000	9600	10200	10800	11400	12000	12600	13200	13800	14400	15000	15600	16200	16800	17400	18000
10500	11200	11900	12600	13300	14000	14700	15400	16100	16800	17500	18200	18900	19600	20300	21000
12000	12800	13600	14400	15200	16000	16800	17600	18400	19200	20000	20800	21600	22400	23200	24000
13500	14400	15300	16200	17100	18000	18900	19800	20700	21600	22500	23400	24300	25200	26100	27000
15000	16000	17000	18000	19000	20000	21000	22000	23000	24000	25000	26000	27000	28000	29000	30000
16500	17600	18700	19800	20900	22000	23100	24200	25300	26400	27500	28600	29700	30800	31900	33000
18000	19200	20400	21600	22800	24000	25200	26400	27600	28800	30000	31200	32400	33600	34800	36000
19500	20800	22100	23400	24700	26000	27300	28600	29900	31200	32500	33800	35100	36400	37700	39000
21000	22400	23800	25200	26600	28000	29400	30800	32200	33600	35000	36400	37800	39200	40600	42000
22500	24000	25500	27000	28500	30000	31500	33000	34500	36000	37500	39000	40500	42000	43500	45000
24000	25600	27200	28800	30400	32000	33600	35200	36800	38400	40000	41600	43200	44800	46400	48000
25500	27200	28900	30600	32300	34000	35700	37400	39100	40800	42500	44200	45900	47600	49300	51000
27000	28800	30600	32400	34200	36000	37800	39600	41400	43200	45000	46800	48600	50400	52200	54000
28500	30400	32300	34200	36100	38000	39900	41800	43700	45600	47500	49400	51300	53200	55100	57000
30000	32000	34000	36000	38000	40000	42000	44000	46000	48000	50000	52000	54000	56000	58000	60000
31500	33600	35700	37800	39900	42000	44100	46200	48300	50400	52500	54600	56700	58800	60900	63000
33000	35200	37400	39600	41800	44000	46200	48400	50600	52800	55000	57200	59400	61600	63800	66000
34500	36800	39100	41400	43700	46000	48300	50600	52900	55200	57500	59800	62100	64400	66700	69000
36000	38400	40800	43200	45600	48000	50400	52800	55200	57600	60000	62400	64800	67200	69600	72000
37500	40000	42500	45000	47500	50000	52500	55000	57500	60000	62500	65000	67500	70000	72500	75000
39000	41600	44200	46800	49400	52000	54600	57200	59800	62400	65000	67600	70200	72800	75400	78000
40500	43200	45900	48600	51300	54000	56700	59400	62100	64800	67500	70200	72900	75600	78300	81000
42000	44800	47600	50400	53200	56000	58800	61600	64400	67200	70000	72800	75600	78400	81200	84000
43500	46400	49300	52200	55100	58000	60900	63800	66700	69600	72500	75400	78300	81200	84100	87000
45000	48000	51000	54000	57000	60000	63000	66000	69000	72000	75000	78000	81000	84000	87000	90000

see next page with example.

Explanation of the use of the Table for finding the Size of Beams, &c., both "strong enough" and "stiff enough."

THE foregoing table gives the size of teak beams, both strong enough—factor of safety=10, and also stiff enough—deflection to $=\frac{L}{40}$ or $\frac{1}{40}$ inch per running foot of beam where L =the length of beam between points of support.

The Table is calculated for "Burma teak."

$$E_a = 3900$$

$$P_b = 800$$

$$\delta = \frac{L}{40}$$

$$n = 10$$

For any other class of timber with different values of E_a , P_b , &c., to that given in the tables co-efficients can be easily calculated which will (in conjunction with the tables) greatly simplify the process of finding the depth and breadth of beams, and the co-efficient once found, the labour in finding the depth and breadth of a beam is reduced to a question of simply multiplication of two numbers.

Let E_a , P_b , δ_1 and n_1 =the values corresponding to any timber other than teak as given in the table, E_a , P_b , δ and n being the values for teak.

Then from Equations I and VII we get

$$d = \frac{5 P_b L^2}{4 n E_a \delta} \dots\dots\dots 1$$

and the co-efficient for finding the depth (d) of beam for any other timber will be

$$\frac{P_b n E_a \delta}{P_b n_1 E_a \delta_1} \dots\dots\dots 2.$$

If $n=n_1$ and $\delta=\delta_1$ then the co-efficient will be

$$\frac{P_b E_a}{P_b E_{a_1}} \dots\dots\dots 3.$$

From Equations I and VII we can deduce

$$b = \frac{8 E_a^2 \delta^2 s w n^3}{25 L^2 P_b^3} \dots\dots\dots 4$$

and the co-efficient for finding the breadth (b) of beam for any other class of timber will be

$$\frac{n^3 E_a^2 \delta^2 P_b^3}{n^3 E_{a_1}^2 \delta_1^2 P_{b_1}^3} \dots\dots\dots 5;$$

and if $n_1=n$ and $\delta_1=\delta$, then the co-efficient will be

$$\frac{E_a^2 P_b^3}{E_{a_1}^2 P_{b_1}^3} \dots\dots\dots 6.$$

For the purpose of illustrating the use of the foregoing table we will take the example given by Cunningham in his "Applied Mechanics" (Vol. III of the "Roorkee Treatise" on Civil Engineering).

Ex.: "A flat-terraced roof weighing 100lbs. per square foot (including weight of beams), rests on 3" x 3" uniform sal 'burgahs,' placed 1 foot apart centrally; these rest on sal beams of uniform rectangular section at 4 feet apart centrally and of 20 span. Design the scantling of the beams, so as to be both strong enough and stiff enough."

[N.B.—The beams may be considered approximately uniformly loaded "supported beams."]

In this example

$$E_a \text{ for sal} = 4200$$

$$P_b \text{ for sal} = 800$$

$$\delta \text{ is assumed} = \frac{L}{40}$$

$$n \text{ is assumed} = 10$$

From the table we find the depth of a teak beam for a 20-foot bearing and loaded with 8000lbs.=to 20.512", and this multiplied by the co-efficient as given in Equation 2 or 3 with the above data for sal=

$$= 20.512 \times \frac{3.9}{4.2} = 19.046$$

and the breadth of the beam from the tables=2.3765, and this multiplied by the co-efficient as given in Equation 5 or 6 and the values of sal gives

$$2.3765 \times \left(\frac{4.2}{3.9}\right)^2 = 2.756" = \text{the breadth.}$$

The number $\left(\frac{4.2}{3.9}\right)^2 = 1.16$ nearly, which is near enough for all practical use.

The sal beams for the above example in practice might be considered as 19" x 3".

The above example, if taken from the table of the "Deflection formulæ" and $R=1.7$ say, would be

$$d = 13.05 \times 1.028 = 13.415$$

$$b = 9.228 \times .8757 = 8.08$$

and from the "Strength Formulæ Tables"

$$R = \sqrt{2} P_b = 800$$

$$d = 11.22$$

$$b = 7.937.$$

which is exactly what Cunningham makes it.

The one for deflection is not what "Cunningham" makes, as we have taken $1.7=R$, whereas he takes $R=\sqrt{3}$.

In the above example the beams 19" x 3" is both strong enough and stiff enough, so is the beam 13.5" x 8", but the last beam, 11.4" x 8", is strong enough but not stiff enough; the deflection of this beam being got direct from the tables, as

$$.9138 \times \frac{3.9 \cdot 0 \cdot 0}{4.2 \cdot 0 \cdot 0} = .85$$

We know in this instance that $R=\sqrt{2}$ and that $\frac{3.9 \cdot 0 \cdot 0}{4.2 \cdot 0 \cdot 0}$ must be the proper co-efficient. The nearest number to $\sqrt{2}$ given in the table of co-efficients is 1.4 and which gives $P_b=800$, $\frac{3.9 \cdot 1 \cdot 3}{4.2 \cdot 0 \cdot 0}$ as the co-efficients to be used for finding the deflection of the beams.

Now both the scantlings (13.4 x 8" and 11.22 x 7.937) obtained from the "Deflection and the Strength Formulæ" have obviously far greater sectional area than that obtained from the tables, namely, 19" x 3" and Cunningham remarks: "Nevertheless the scantling (3" x 19") would not be adopted as being practically unsuitable for timber in which a 19" depth is seldom obtainable, and "also in consequence of the great excess of the depth (d) over the breadth (b), "which would render the beam liable to fail by twisting."

There are, however, some instances in which the scantlings as given in the table can be used.

Ex.: Suppose we wish a beam of teak 10 feet long to support 11,000lbs. uniformly distributed.

Then from the table we find, to be both stiff enough and strong enough, it will be 10.25" x 6.53".

From the "Deflection Tables" $R=\sqrt{2}$; it will have to be 9.993" x 7.066".

From the "Strength Tables" $R=\sqrt{2}$, it will have to be 9.907" x 7.005" or 10" x 7" in both deflection and strength formulæ, which gives a sectional area of 70 superficial inches, and the first scantling (say 10.4" x 6.5") gives 66.8 square inches.

This table can be used as long as the "Deflection formulæ" gives larger results than the "Strength formulæ," but as soon as the "Strength formulæ" gives larger results than the "Deflection formulæ" the rule regarding stiff enough and strong enough without loss of material fails.

The point where it begins to change from a smaller value of the three different formulæ to a greater value is found by equating for value of s ,—Equation II or Equation VIII = to Equation XIII,—and the result will be found equal to what was derived in Equation XXXVI.

Hence the diagram, which shows when the "Deflection formulæ" and when the "Strength formulæ" should be used, is also applicable to this table.

The example we selected hardly shows a saving, as it is too near the what might be called the boundary line where the ratio of $\frac{\text{depth}}{\text{breadth}} = \sqrt{2}$.

Suppose, however, we had a 13-foot length to bear a load of 14,300lbs. the scantling for a beam strong enough and stiff enough would be

$$13.33" \times 6.54" = 7.87 \text{ cubic feet.}$$

$$\text{From "Deflection formulæ"} = 12.17 \times 8.603 = 9.448 \text{ cubic feet.}$$

$$\text{From "Strength formulæ"} = 11.81 \times 8.344 = 8.888 \text{ cubic feet.}$$

The difference now is conspicuous, a beam 13.3" x 6.5" would satisfy every requirement for practical purposes as regards ratio of depth to breadth.

TABLE
Showing the weight per superficial foot Teak Planking of different thickness supported, at both ends, weight-distributed, whereas Planks are, in practice, side of safety.

BURMA

$$E_d = 3900$$

$$\delta = \frac{L}{40}$$

No. of lbs. per s. ft.	BURMA														Safe bearing length in feet
	DEPTH OF PLANKS														
	2"		2 1/2"		3"		3 1/2"		4"		4 1/2"		5"		
	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	
10	2860	6028	4290	1030	5720	1385	7150	1732	6580	2078	1001	2424	1144	2771	
20	2270	4899	3405	7348	4540	9798	5676	1225	6810	1469	7345	1714	9080	1959	
30	1983	4000	2974	6000	3966	8000	4958	1000	5943	1200	6941	1400	7232	1600	
40	1801	3404	2702	5196	3603	6928	4504	8660	5405	1039	6306	1212	7207	1385	
50	1672	3098	2509	4647	3345	6196	4181	7746	5018	9235	5854	1084	6690	1239	
60	1574	2828	2361	4242	3148	5657	3935	7071	4722	8485	5509	9899	6296	1131	
70	1495	2619	2242	3927	2990	5237	3738	6547	4485	7855	5233	9165	5981	1048	
80	1430	2450	2145	3674	2860	4899	3575	6124	4290	7348	5005	8575	5720	9798	
90	1375	2309	2062	3464	2750	4618	3437	5773	4125	6928	4812	8083	5500	9237	
100	1327	2190	1991	3286	2655	4381	3319	5477	3983	6372	4647	7668	5310	8763	
110	1286	2085	1928	3134	2572	4178	3215	5222	3858	6207	4501	7312	5144	8353	
120	1249	2047	1874	3070	2498	4093	3123	5116	3748	6139	4372	7163	4997	8186	
130	1217	1990	1824	2982	2433	3943	3041	4903	3649	5764	4257	6725	4865	7866	
140	1186	1951	1780	2977	2373	3703	2967	4629	3560	5555	4153	6480	4747	7406	
150	1159	1788	1739	2683	2319	3577	2899	4472	3479	5366	4059	6261	4639	7155	
160	1136	1732	1703	2598	2270	3464	2837	4330	3405	5196	3973	6062	4540	6928	
170	1112	1660	1668	2520	2224	3360	2781	4200	3337	5041	3893	5881	4449	6721	
180	1091	1633	1637	2450	2183	3266	2728	4082	3274	4899	3820	5715	4366	6532	
190	1072	1589	1607	2384	2143	3178	2680	3973	3215	4768	3751	5563	4287	6357	
200	1053	1569	1580	2323	2107	3098	2634	3873	3161	4647	3688	5422	4215	6196	
210	1036	1511	1555	2267	2073	3023	2591	3779	3110	4535	3628	5291	4147	6047	
220	1020	1477	1532	2215	2041	2954	2552	3692	3062	4431	3573	5169	4084	5906	
230	1005	1444	1508	2167	2011	2889	2514	3611	3017	4334	3520	5056	4023	5778	
240	9916	1414	1487	2121	1983	2828	2479	3535	2974	4242	3470	4950	3966	5657	
250	9782	1385	1467	2078	1956	2771	2445	3464	2934	4157	3423	4849	3912	5542	
260	9655	1359	1448	2038	1931	2717	2413	3397	2896	4076	3379	4755	3862	5435	
270	9534	1333	1430	2000	1906	2666	2383	3333	2860	4000	3337	4667	3813	5334	
280	9419	1310	1413	1964	1884	2619	2354	3273	2825	3927	3297	4582	3768	5237	
290	9309	1286	1397	1929	1862	2573	2327	3216	2793	3859	3259	4502	3724	5146	
300	9205	1265	1381	1897	1841	2530	2301	3163	2761	3794	3222	4427	3682	5069	

For other timbers, with different values of E_d , P_b , n and s

No. IV.

will support and the safe bearing length. The Planks are assumed to be simply generally fixed at both ends and continuous, and so the Table will err on the

TEAK PLANKS.

$$P_b = 800$$

$$n = 10$$

TEAK PLANKS.

IN INCHES.

2 1/2"		2 1/2"		2 1/2"		3"		3 1/2"		3 1/2"		3 1/2"		4"	
Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.	Stiffness.	Strength.
1287	3117	1430	3464	1573	3810	1716	4157	1859	4503	2002	4849	2145	5196	2288	5542
1021	2204	1136	2450	1248	2694	1362	2939	1745	3185	1589	3429	1703	3674	1816	3919
8924	1800	9916	2000	1090	2200	1190	2400	1289	2600	1388	2800	1487	3000	1586	3200
8108	1558	9009	1732	9910	1905	1081	2078	1171	2251	1261	2424	1351	2598	1441	2771
7527	1394	8363	1549	9199	1704	1003	1859	1087	2014	1171	2169	1254	2323	1338	2478
7083	1272	7870	1414	8657	1555	9444	1697	1023	1838	1102	1980	1181	2121	1259	2202
6728	1178	7476	1310	8223	1440	8971	1571	9719	1702	1046	1833	1121	1964	1196	2095
6435	1102	7150	1225	7847	1347	8580	1469	9295	1592	1001	1714	1072	1837	1144	1959
6187	1039	6875	1154	7563	1270	8250	1385	8938	1501	9625	1616	1031	1732	1100	1847
5974	9859	6638	1095	7302	1205	7965	1314	8629	1424	9293	1533	9957	1643	1062	1752
5787	9400	6430	1043	7073	1149	7716	1254	8359	1357	9002	1463	9645	1566	1029	1672
5622	9209	6246	1024	6871	1125	7496	1228	8120	1330	8745	1433	9370	1535	9994	1637
5474	8646	6082	9607	6690	1057	7298	1153	7907	1249	8515	1345	9123	1441	9731	1537
5340	8332	5933	9258	6527	1018	7120	1111	7714	1203	8307	1296	8900	1388	9494	1481
5219	8049	5799	8944	6378	9838	6959	1073	7538	1162	8118	1252	8698	1341	9278	1431
5108	7794	5676	8660	6243	9526	6810	1039	7378	1125	7946	1212	8513	1299	9081	1385
5005	7561	5562	8401	6118	9241	6674	1008	7230	1092	7786	1176	8343	1260	8899	1344
4911	7348	5457	8165	6002	8981	6548	9798	7094	1061	7640	1143	8185	1225	8731	1307
4823	7152	5359	7947	5895	8742	6431	9536	6967	1033	7503	1112	8039	1192	8575	1271
4741	6971	5268	7746	5795	8526	6322	9295	6849	1007	7376	1084	7903	1162	8429	1239
4665	6803	5183	7559	5702	8315	6220	9071	6738	9827	7257	1058	7775	1133	8294	1209
4593	6647	5104	7385	5614	8124	6124	8863	6635	9601	7145	1034	7656	1107	8166	1181
4526	6500	5028	7223	5531	7945	6034	8667	6537	9390	7040	1011	7543	1083	8046	1155
4462	6364	4958	7071	5453	7778	5949	8485	6445	9192	6941	9899	7437	1060	7932	1131
4401	6235	4891	6928	5380	7621	5869	8313	6358	9006	6847	9699	7336	1039	7825	1108
4344	6114	4821	6793	5310	7473	5793	8152	6275	8832	6758	9511	7241	1019	7724	1087
4290	6000	4767	6666	5243	7333	5720	8000	6197	8666	6674	9333	7150	1000	7627	1067
4238	5891	4709	6547	5180	7201	5651	7855	6123	8510	6593	9165	7064	9819	7535	1048
4189	5789	4654	6432	5120	7076	5585	7719	6051	8362	6517	9005	6983	9649	7448	1029
4142	5692	4603	6325	5063	6957	5523	7589	5983	8221	6443	8854	6904	9486	7364	1012

see next page with equations.

A note on table No. IV showing the weight per superficial foot teak planking of different thicknesses will support, and the safe bearing length with its adaptation to other timbers and deflections other than $\frac{1}{40}$ and also for other factors of safety.

From Equation II we get—

$$d = L^{\frac{3}{4}} \left[\frac{25w Rs}{E_d} \right]^{\frac{1}{4}}$$

or

$$L = \frac{d^{\frac{4}{3}} E_d^{\frac{1}{3}}}{w^{\frac{1}{3}} s^{\frac{1}{3}} R^{\frac{1}{3}} 25^{\frac{1}{3}}} \dots\dots\dots 1.$$

If we substitute the value of R , i.e., $\frac{d}{b}$ in the above, we will get—

$$L = \frac{d E_d^{\frac{1}{3}} b^{\frac{1}{3}}}{w^{\frac{1}{3}} s^{\frac{1}{3}} 25^{\frac{1}{3}}} \dots\dots\dots 2.$$

Now if we put $b=12$ inches and $s=1$ foot and giving the value 3,900 to E_d in the above, we will find that

$$L = \frac{d}{w^{\frac{1}{3}}} (1872)^{\frac{1}{3}} \dots\dots\dots 3.$$

Hence by giving different values to d and w , as has been done in the tables, a series of numbers have been obtained, which represents the weight per superficial foot which will only deflect the planking $\frac{1}{40}$.

In this calculation no account has been taken of the weight of the planking itself, and it has been also assumed that it is simply supported and the weight equally distributed.

Some of the results in the table will doubtless appear absurd.

As an example 4" planking with 10lbs. per superficial foot is put down for safe bearing at 22.88 feet for deflection, and 55.42 for breaking weight, factor of safety=10, but it is evident that neither one nor the other would bear their own weight. This, of course, is an extreme case and would never be required in practice, and it may be safely laid down that the cases which occur in practice, the weight of the planking itself will be so insignificant as to be not worth considering and may very well be thrown into the contingencies.

A co-efficient for finding the safe bearing length of any other timber other than teak, as given in the table will be—

$$\frac{E_d^{\frac{1}{3}}}{3900^{\frac{1}{3}}} \dots\dots\dots 4.$$

And this multiplied by the length as given in the table, will give the bearing length of the timber with a value= E_d to deflect only $\frac{1}{40}$.

For deflections other than $\frac{1}{40}$ we have only to consider that if—

w will deflect the beam $\frac{1}{n}$ inch

$2w$ will deflect the beam $\frac{2}{n}$ inch

$3w$ will deflect the beam $\frac{3}{n}$ inch

and so on, as long as the elasticity of the beam remains unimpaired; and by entering the tables with the proper weight, we can obtain what the beam will bear without deflecting beyond a certain amount.

Thus should we wish a deflection of $\frac{1}{20}$ instead of $\frac{1}{40}$, we must enter the tables with $2w$.

If we require a deflection of $\frac{1}{80}$ we must enter with only $\frac{w}{2}$, and in fact as the tables are constructed for a deflection of $\frac{1}{40}$, if we call any other deflection which we may require θ , we must enter the tables with $\frac{40}{\theta} \times w$.

From Equation VIII we can deduce that—

$$L = \sqrt[2]{\frac{d^2 2 P_b}{n w s}} \dots\dots\dots 5$$

and giving the values of 800, 12", 10 and 1 foot to P_b , b , n , and s respectively we get—

$$L = \frac{d}{w^{\frac{1}{2}}} (1920)^{\frac{1}{2}} \dots\dots\dots 6.$$

A co-efficient for finding the safe bearing length of other timber planks for a known weight will be—

$$\left[\frac{P_b}{P_b} \right]^{\frac{1}{2}} \text{ or } \left[\frac{P_b}{800} \right]^{\frac{1}{2}} \dots\dots\dots 7.$$

And for other factors of safety n_1 — if the result is multiplied by $\frac{n_1}{10}$ it will give the required result.

The co-efficients $\frac{Ed^{\frac{1}{3}}}{3900^{\frac{1}{3}}}$ and $\frac{P_b^{\frac{1}{2}}}{800^{\frac{1}{2}}}$ are entered in co-efficient tables for deflection and strength.

Table showing the want of uniformity in the Size of Scantlings in some well-known Buildings in Burma.

[illegible][illegible]

Table showing the want of uniformity in the Size of Scantlings in some well-known Buildings in Burma—(concluded).

Name of building and of what materials constructed.	BEAMS AND JOISTS, &c.				Length of scantling.	Distance apart.	Size of cantling.	Depth or R .	Area of flooring on beam.	CO-EFFICIENTS CORRESPONDING TO R .			Depth of scantling corresponding to tables.	Total load on scantling to deflect $\frac{L}{40}$.	Load per superficial foot of flooring to $= \frac{L}{40}$.	Total breaking-weight on beam factor of safety = 10.	Breaking-weight per superficial foot.	Remarks.
	Length of scantling.	Distance apart.	Size of cantling.	Depth or R .						For finding depth.	Reciprocal depth.	Breaking-weight.						
Details of scantlings taken from No. XLVII, Volume I of Professional Papers on Indian Engineering, 1863-64—concluded.																		
Pucka Buildings—concluded.	Roof	...	...	...	11'	10'	5'	15" × 10"	1.5	110	...	.9853	.001232	44000	400	...	...	...
					10'	5'	10" × 6"	1.7	55	...	.955	.001194	9200	167	...	...	...	
					5'	1'	4" × 4"	1	55	...	1.090	.001363	1370	250	...	...	...	
Teakwood Buildings.	RANGOON CUSTOM-HOUSE AS TAKEN FROM SPECIFICATION.	...	...	...	11'	10'	5'	15" × 10"	1.5	110	...	.9853	.00124	44000	400	...	...	...
					10'	5'	12" × 9"	1.33	55	...	.1021	.00128	25000	418	...	...	...	
					5'	1'	5" × 4"	1.25	5.5	...	.1021	.00128	2550	464	...	...	...	
High School, RANGOON.	...	...	...	...	11'	10'	6'	13" × 9"	1.4	110	...	.1003	.00125	26400	240	...	...	...
					10'	6'	8" × 6"	1.3	60	...	.1021	.00128	4900	82	...	...	...	
					6'	1'	3" × 3"	1.00	6	...	1.090	.00136	360	60	...	...	...	
(Now the Rangoon College)	...	...	...	...	24'	10'	1'	10" × 5"	1.5	240	...	.9855	.00124	1800	75	...	...	...
					10'	1'	6" × 2"	3.0	15	...	.8286	...	700	...	...	...	...	
					16'9"	8'	1'	12" × 9"	1.33	50½	...	1.021	.00128	25000	397	...	...	...
Burma Club over Scott and Co. roof of Scott and Co.	...	...	...	...	3'	1'	1'	8" × 3"	1.0	8	...	1.090	.00136	360	120	...	...	...

A few remarks on the want of uniformity in some well-known buildings in Burma may not be out of place to show some of the wants of a table as a guide to render the calculations less liable from error than heretofore, and also to draw attention to some parts which would probably escape the casual reader unless rendered more prominent.

In the first place the tables and co-efficients will not give to the exact "lb." what will cause the beam to be deflected $\frac{L}{40}$ or the breaking weight.

A table to do so would be too voluminous and of not much practical value except for "theorists" to test their results by.

As an example we will take the first beam mentioned on the table, *i.e.*, a 12" x 4" beam, length 24 feet, span 15 feet, but there are double beams at each set of posts (the building being constructed totally of timber on teak posts, &c.); it is evident that only 7½ feet of the flooring out of the 15 feet span rest on the beam 12" x 4".

Now if we work the weight for a beam 12" x 4" by the deflection formulæ (rigidly), we will find that at 24 feet length it will require to make it deflect $\frac{L}{40}$ 1,872lbs. and with a factor of safety = to 10 it will take as breaking weight 3,840 lbs. The difference of 48lbs. in the former case and 74lbs. in the latter between the results, as in tabulated form, and actually calculated, can be accounted for by the fact that in the results we wanted the deflection of a beam of 9.943 inches

in depth and the breadth = to $\frac{9.943}{\sqrt{2}}$ inches in breadth, whereas we have taken

the nearest result, namely, 10.01".

Had we taken the proportion part between the two nearest numbers to 9.943, we would get the correct answer within a couple of lbs.

The difference of 48lbs. and 74lbs. would not be thought of any moment by the practical man who knows that a large factor of safety covers the results, or if the deflection should be the minutest quantity in excess, or under, it would matter very little; at any rate, neither a 9.943 nor a 10.01 beam could be cut; it would be taken as 10", and the difference as shown in the tables does not amount to ½ lb. per superficial foot in either case, whichever quantity is taken. This may be called the inverse problem, *i.e.*, of finding what a certain beam will support, dimensions being given, and is the least required when designing, unless a quantity of different scantlings are in stock and it is required to dispose of them.

Cases may arise where the table will appear inadequate to perform the task of finding the dimensions. Thus we see in two beams quoted as being put into the "Custom-house" of "Rangoon," one 17" x 10" and the other 15" x 10", and after multiplying by the reciprocal for the corresponding depth in the tables we find on looking there that the table for a 11 feet length of beam will only give at the furthest 13.79" = to supporting 33,000lbs., with a deflection of only $\frac{L}{40}$, whereas we require to know what a beam 16.235" will support. We can arrive at the weight such a beam will support in such a case by a very easy process.

1st.—If the beam is larger than given in the table divide the depth by 2, which in the case just mentioned will be = to 8.117".

2nd.—Find from the tables the weight 8.117" depth of beam will support for the length of beam.

3rd.—Multiplying this last result by 16 (2⁴) and the product will be the weight required.

Thus the beam 8.117" depth from the tables will support when the length is 11 feet 3,960lbs. and this multiplied by 16 gives 63,360lbs., a beam

$16.235 \times \frac{16.235}{\sqrt{2}}$ would bear, or a beam 17" x 10" will bear, which is equivalent to a beam $16.235 \times \frac{16.235}{\sqrt{2}}$ as regards deflection.

In nearly all the examples given in the table it will be noticed the main beams are the weakest part of the floor, whereas it should be the strongest if anything. The main beams having to support its own weight and the weight of other cross-beams, joists, and flooring, or roofing above, and for the cross-beam the weight to be supported is less than what the main beams have to support by the weight of the main beams, and so on for joists.

A great want of uniformity will be observed in the roof of the "Rangoon Custom-house:" the main beams will bear 400lbs. per superficial foot, the cross-beams only 167lbs. per superficial foot, and the joists 250lbs. and deflect only $\frac{1}{40}$. The details of scantlings for this building were obtained from the "Professional Papers on Indian Engineering," No. XLVII of 1863-64. An old printed specification, however, gives a different result, which is more uniform for the first floor, but is very inconsistent for the roof.

The large amount of 400lbs. per superficial foot for the first floor evidently points to the fact that it must have been designed as a sort of warehouse by Captain J. M. Williams, the Executive Engineer of the Rangoon Division.

In the tabulated statement of wooden buildings it should be observed that in deducing the safe weight per superficial foot we have assumed or taken the beams and joists as simply supported at both ends and load distributed.

The girders in a wooden building are assuredly in a certain fixed state, whether a perfect fixed beam or not; it is believed no experiments have been carried out to test.

The joists and the planking above may be considered as continuous beams, and the results we have shown as the safe weight per superficial foot may be safely taken as greatly within the limits, *i.e.*, the planking may be taken as continuous and not simply supported; the joists may be taken as partly continuous, if not quite; and the beams may be taken as partly fixed at ends although probably not perfect.

Now as the main beams in a wooden building can only be taken as an imperfectly fixed beam, it is evident that it should be of larger dimensions or able to support more per superficial foot than either joists or planking; that is, if this axiom holds good, "No whole" is stronger than its "weakest part."

For the difference as regards deflection and strength, in continuous fixed and simply supported beams, a reference must be made to such works as "Rankine" and "Cunningham," &c., but still for all purposes it is not in practice necessary to consider such questions if we are only consistent throughout.

It is very seldom in practice that a beam of timber is considered either as fixed or continuous.

Of course various artifices are employed to give it a continuous or a fixed bearing, but at the best it can only be calculated as a beam supported, as sufficient data is not to the fore to admit of any other, although it may actually according to the calculation of a simple supported beam be more than sufficient.

The weight per superficial foot to deflect the beams $\frac{1}{40}$, and the breaking weight per superficial foot of flooring have been tabulated for some of the buildings in Rangoon, and from that statement it will be seen that the weight per superficial foot to deflect $\frac{1}{40}$ varies from 8.3lbs. in a "Company Barrack" to 57.7lbs. in a "Conductor's Quarters" and to 73.7lbs. in a "Native Hospital Assistant's Quarters," *i.e.*, the less the dignity and pretension of the building the better flooring it has.

Joists that carry 1" teak planking above need never be placed nearer than 3 feet in a wooden building of the ordinary construction in Burma. It will then safely bear without deflecting $\frac{1}{40}$ 70lbs. per superficial foot and will not break under 200lbs. per superficial foot, allowing a factor of safety = to 10 (see Table IV).

Anyone who is dubious about this matter need only notice the upper deck flooring of the Irrawaddy Flotilla Company's mail steamers to "Mandalay."

The planks are not more than 1 inch thick, the deck is generally crowded with passengers, and the whole deck may be said to be subject to a continual earthquake by the vibrations of the engines; and the joists are certainly over 3 feet apart. No ordinary dwelling would be liable to be put to such a test. So the further we can put the joists apart the more economical; if we have to use 1 inch planking, and for wear-and-tear and scrubbing, &c., we cannot very well use less.

It should, moreover, be remembered that the planking is really continuous and will support much more than 70lbs. per superficial foot without deflecting $\frac{1}{40}$.

In the present P. W. Secretariat (late Brothers' School) the planks are put on 6" x 4" joists placed 4 feet 4 inches apart. The joists have various lengths, but from 10 to 12 feet are the principal ones.

The planks 4' 4" bearing will support only between 20 and 30lbs. per superficial foot and deflect $\frac{1}{40}$ and joists 6" x 4" and 10 feet length placed 4' 4" apart will support about 32lbs. without exceeding the necessary amount of deflection.

In this last case the planking is evidently weak, but still 3 feet will, it is believed, be found a good distance to place the joists apart in wooden houses in Burma.

TABLE No. V.

Values of E for Teak as derived from Captain Baker's Experiments, l being in inches.

No.	Specific gravity.	Breaking-weights $= \frac{P}{l} = \frac{W}{b d^2}$ l being in feet.	Value of $E = \frac{P^3 W}{b d^3}$	Where procured.	Number of results.	Value of "Koorkee" E_d l being in feet.	Remarks.
1	687	654	7,652,326	Rangoon	5	4428	Seasoned some years.
2	690	651	7,050,777	Bombay	6	4080	
3	730	602	6,386,907	Pegu	3	3696	
4	724	731	8,050,403	Malabar	3	4659	Seasoned.
5	698	725	8,471,875	Luzar	3	3745	
6	743	688	8,357,011	Malabar	3	4836	
7	743	683	8,556,428	Magazine Gun Carriage	2	4951	Plank, unseasoned.
8	663	631	8,748,000	Dutch house at Chinsura	6	5063	Very old beam.
9	743	730	7,290,000	Cossipore	6	4219	Seasoned.
	6411	6145	68,563,727 = Sums		37	39677	
	713	683	7,618,192 = Means			4409	

Then $\frac{7618192}{9} = 846465.777 = E_d$ when l , the length of the beam is taken in feet and 683 = P , l being in feet.

The above table was extracted from "Scantlings of Timbers for Roofs" by (the late) Ensign Peter Keay, 2nd edition, 1872.

*Mr. Keay has got the mean value of E_d as 4498, whereas the arithmetical mean of the nine results is 4409. An error has crept in in dividing the sum by 9.

If a simple arithmetical mean of Nos. 1 and 3 is taken (the timber of Rangoon and Pegu) then the value of E_d for Burma timber will be 4062.

TABLE No. VI.

Supplementary Table of Properties of Timber grown in Ceylon selected and computed from a table of the Properties of Ninety-six kinds of Timber by Moodliar A. Mendis.

Timber.	Weight of a cubic foot in lbs.	Modulus of rupture in lbs. on the square inch.	Modulus of elasticity in lbs. on the square inch.	Roorkee P_b breaking weight.	Roorkee E_d deflection.	Botanical name.
Aludel	51	12,800	1,850,000	711	4281	Artocarpus pubescens.
Burute or satinwood	55	18,800	2,700,000	1044	6249	Chloroxylon swietenia.
Caha millie	56	13,900	2,000,000	772	4629	Vitex altissima?
Cos or jack	42	11,000	1,810,000	611	4189	Artocarpus integrifolia.
Ebony or caluvere	71	13,000	1,360,000	732	3148	Diospyros ebenus.
Gal or hal mendoza	57	13,300	1,530,000	739	3541	Vateria sp. —?
Ital millie	48	15,200	970,000	844	2245	Berrya ammonilla.
Mee	61	13,000	1,880,000	722	4351	Bassia Longifolia.
Meean Millie	56	14,200	2,040,000	789	4722	Vitex altissima.
Naw or ironwood	72	17,900	2,580,000	994	5972	Mesua Nagaha.
Paloo	68	18,900	2,430,000	1050	5625	Mimusops hexandra.
Sooriya	42	12,700	2,610,000	706	6041	Thespesia populnea.
Tal or palmyra	65	14,700	2,810,000	817	6504	Borassus flabelliformis.
Teak	55	14,600	2,800,000	811	6481	Tectona grandis.

Additional data from the experiments of Captain Fowke, R.E., Captain Mayne, R.E., and Moodliar A. Mendis.

Teak from Johre, Malay Peninsula	...	...	19,400	...	1077	...	
Teak from Cochin China	...	44	12,100	1,990,000	673	4606	
Teak from Moulmein	...	42	11,520	1,900,000	639	4399	
Ironbark (Australia)	...	64	24,400	964,000	1356	2231	Eucalyptus.
Iron, rough leaved	...	64	22,500	1,157,000	1250	2430	Eucalyptus.
Jarraha or Australian mahogany	...	59	20,238	1,157,000	1124	2662	Eucalyptus gigantea.
Stringy-bark from Australia	...	54	18,000	1,709,000	1723	3935	

The above table has been extracted from "Rankine's useful Rules and Tables," with the exception of the last two columns showing the value of the Roorkee P_b and E_d .

TABLE No. VII.
Weight and Strength of Timber.

Material.	Botanical name.	Specific Gravity.	Weight of a cubic foot in pounds.	MODULI OF STRENGTH.			Modulus of direct tensile E_d in lbs. on the square inch.	ROORKEE.		Authority and Remarks.
				Tensile f_t .	Crushing f_c .	Cross-breaking $f_b = 18 f_c$.		P_b .	E_d .	
Ash	Fraxinus excelsior	753	47	17,000	9,000	12,000	1,600,000	657	3703	Cunningham.
Ash	Ditto	760	...	...	...	14,000	...	778	...	Farlow.
Ash	Ditto	47	...	...	...	...	...	675	...	Cunningham.
Bamboo	Bambusa arundinacea	69	27	6,300	9,300	9,000	2,801	686	2801	Cunningham.
Beech	Fagus sylvatica	69	43	11,500	...	9,000	1,350,000	970	5735	Cunningham.
Beech	Ditto	69	...	...	...	...	...	667	...	Cunningham.
Beech	Ditto	69	...	...	...	...	...	667	...	Barlow.
Birch	Betula alba	711	44	15,000	6,400	11,700	1,645,000	650	3798	Cunningham.
Blue gum	Eucalyptus globulus	845	52	...	...	11,000	...	689	...	Cunningham.
Box	Ditto	96	60	20,000	10,300	20,000	...	1,111	...	Cunningham.
Bullet tree	Adras suteroyon	...	...	...	14,000	15,900	...	...	...	Cunningham.
Ditto	Ditto	456	30	11,400	5,800	22,000	485,000	411	1125	Cunningham.
Cedar of Lebanon	Cedrus Lebani	...	30	...	9,900	7,400	...	...	...	Cunningham.
Cabaculi	---	...	...	...	...	15,000	...	...	...	Cunningham.
Ditto	Castanea vesca	535	33	10,000	...	16,000	1,140,000	639	2638	Cunningham.
Chestnut	Ditto	...	...	13,000	...	10,660	...	...	...	Cunningham.
Covvie	Dammara australis	1,193	74	...	19,000	11,000	...	1,500	...	Cunningham.
Ebony (West Indian)	Brya ebenus	544	71	...	10,000	27,000	1,380,000	723	3148	Cunningham.
Ebony (Cingalese)	Diospyros ebenus	544	84	...	10,300	13,000	700,000	533	3020	Cunningham.
Elm	Ulmus campestris	544	...	14,000	...	6,000	1,390,000	338	3020	Cunningham.
Elm	Ditto	553	...	...	...	9,700	...	338	...	Barlow.
Elm	Larix Europaea	553	31 to 35	9,000	5,570	5,000	900,000	278	2983	Cunningham.
Fir, Larch	Ditto	551	...	10,000	...	10,000	1,380,000	284	3148	Cunningham.
Larch, 1st specimen	Ditto	551	...	...	...	...	...	277	1426	Barlow.
Larch, 2nd specimen	Ditto	551	...	...	...	...	...	376	2077	Barlow.
Larch, 3rd specimen	Ditto	556	...	...	...	...	...	383	2437	Barlow.
Larch, 4th specimen	Ditto	560	...	...	...	...	...	387	4532	Barlow.
Larch (New England)	Ditto	553	...	...	...	...	...	397	5072	Barlow.
Fir (New England)	Ditto	553	...	...	...	...	...	397	5072	Barlow.
Fir (Rise)	Ditto	553	...	...	...	...	...	397	5072	Barlow.
Fir, 1st specimen	Ditto	753	...	...	...	...	...	397	5072	Barlow.
Fir, 2nd specimen	Ditto	753	...	...	...	...	...	397	5072	Barlow.
Fir, 3rd specimen	Ditto	753	...	...	...	...	...	397	5072	Barlow.
Fir, 4th specimen	Ditto	753	...	...	...	...	...	397	5072	Barlow.
Fir, 1st specimen	Ditto	696	...	...	...	...	...	397	5072	Barlow.
Fir, 2nd specimen	Ditto	696	...	...	...	...	...	397	5072	Barlow.
Fir, 3rd specimen	Ditto	696	...	...	...	...	...	397	5072	Barlow.
Fir, 4th specimen	Ditto	696	...	...	...	...	...	397	5072	Barlow.
Fir (yellow pine, American)	Pinus variabilis	46	29	...	5,400	...	...	...	...	Barlow.
Fir, red pine	Pinus sylvestris	46	30 to 44	15,000	6,200	7,100	1,460,000	384	3379	Cunningham.
Fir, red pine	Ditto	657	...	14,000	6,200	9,500	1,900,000	447	4395	Cunningham.
Fir, red pine	Ditto	657	...	13,400	...	9,900	1,400,000	550	3240	Cunningham.
Fir, spruce	Abies excelsa	45 to 7	30 to 44	...	...	...	...	...	...	Cunningham.

DEFLECTION-FORMULÆ.

Formulae to be used in the Tables for Deflection of Beams $\frac{L}{40}$

Enter the tables with

Rectangular beams fixed at one end and loaded at the other	... $\frac{128}{5} W$
Rectangular beams fixed at one end loaded uniformly	... $\frac{48}{5} W$
Rectangular beam supported at both ends loaded in middle	... $\frac{8}{5} W$
Rectangular beam supported at both ends loaded uniformly	... W
Rectangular beams fixed at both ends loaded in middle	... $\frac{2}{5} W$
Rectangular beams fixed both ends loaded uniformly	... $\frac{W}{5}$

The above formulæ will give from the tables depth and breadth of beams, &c., corresponding to a deflection of $\frac{L}{40}$, but should some other scantling be desired corresponding to a deflection of $\frac{1}{n}$ th inch per running foot, then enter the tables, with above formulæ multiplied by $\frac{n}{40}$.

Thus, suppose we wish to have a beam to bear a central load of, say, 5,000lbs. and not to deflect more than $\frac{1}{30}$ inch per foot, or rather $\frac{L}{30}$ — beam supported at both ends, we must enter the tables with $\frac{5}{3} \times 5000 \times \frac{1}{30} = 6,000$ lbs.

If the beam was, say, 20 feet long between points of support, we find from the table that the proper scantling for teak $E_d = 3900$, $\frac{\text{depth}}{\text{breadth}} = \sqrt{2}$ would be 12.14×8.588 and these results will be found along the 20 feet length of beam, and under 3 feet distance apart of beams.

The above result is for teak $E_d = 3,900$, $R = \sqrt{2}$; but it is easily converted into any other ratio $\frac{\text{depth}}{\text{breadth}}$ for teak, or for any other timber by the co-efficients table.

In fact, the tables are applicable for all timbers for engineering purposes, mentioned in "Cunningham". Suppose we wish to use "deodar" (Cedrus deodara) $E_d = 1,800$ as ordered by the Punjab Government, and suppose: the ratio of depth to breadth = 2 : 1, then from the table of co-efficients we find that the number to be employed to find the depth and breadth are 1.323 and .9355 respectively.

Then—

$$12.14 \times 1.323 = 16.061 = \text{depth,}$$

$$8.588 \times .9355 = 8.034 = \text{breadth,}$$

of timber 20 feet long to support a central load of 5,000lbs., the beam only to deflect $\frac{L}{30}$

We also find from the place where the 12.14 and 8.588, that the breaking-weight per superficial foot is = to 168.9lbs., i.e., for every 100lbs. which will deflect the beam $\frac{L}{30}$ it will require 168.9 lbs. (allowing a factor of safety of 10) to break the beam, or a total weight of $1.689 \times 6,000 = 10,134$ lbs. This is for teak $E_d = 3,900$, $R = \sqrt{2}$ and $P_t = 800$, or for a beam of teak 12.14 inches $\times$ 8.588 inches 20 feet in length; but should we wish to know the breaking-weight of deodar, we must first know the value of P_t for that timber. There are several

values of P_b for deodar given in "Cunningham," but 500, as used by Major Mackesy in his Article *LVI* of "Professional Papers of 1872" is probably a fair average number to use.

Hence from the deflection tables and co-efficients we have the breaking-weight of a deodar beam—

$$P_b = 500 \quad R = 2:1 \quad E_d = 1800 = 10134 \times 500 \times .002049 = 10377 \text{ lbs.}$$

Cases may arise where the table will appear inadequate to perform the task of finding the dimensions.

Thus we see in two beams quoted, as being put into the "custom-house"* of "Rangoon," one 17" x 10" and the other 15" x 10", and after multiplying by the reciprocal for the corresponding depth in the tables, we find on looking there that the table for a 11-feet length of beam will only give at the furthest 13.79" = to supporting 33,000 lbs., with a deflection of only $\frac{L}{40}$, whereas we re-

quire to know what a beam 16.235" will support. We can arrive at the weight such a beam will support in such a case by a very easy process.

1st. If the beam is larger than given in the table, divide the depth by 2, which in the case just mentioned will be = to 8.117".

2nd. Find from the tables the weight 8.117" depth of beam will support for the length of beam.

3rd. Multiply this last result by 16 (2⁴) and the product will be the weight required.

Thus the beam 8.117", depth from the tables, will support, when the length is 11 feet, is 3,960 lbs. and this multiplied by 16 gives 63360 lbs. a beam of $16.235 \times \frac{16.235}{\sqrt{2}}$ would bear, or a beam 17" x 10" will bear, which is equivalent to a beam $16.235 \times \frac{16.235}{\sqrt{2}}$ as regards deflection.

The inverse problem is apparent from the above, i.e., when we wish to determine the size of beam we require to support a weight larger than given in the tables.

Enter the tables with $\frac{1}{16}$ of the weight, and find what scantling it will require to support this weight, then double the depth will give the depth of a beam to support the whole weight.

* See list further back showing the want of uniformity in some well-known buildings in Burma.

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = \frac{800}{3900} \quad \frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		1	2	3	4	5	6	7	8	9	10
Depth of beam in inches	1	.5487	.6526	.7222	.7760	.8205	.8588	.8925	.9228	.9504	.9758
Breadth of beam in inches		.3880	.4614	.5106	.5487	.5802	.6072	.6311	.6525	.6720	.6899
Sectional area in sup. feet		.001478	.002091	.002560	.002957	.003306	.003621	.003912	.004181	.004435	.004675
Contents in cubic feet		.001478	.002091	.002560	.002957	.003306	.003621	.003912	.004181	.004435	.004675
Weight in lbs.		.06653	.09405	.1152	.131	.1487	.1630	.1760	.1881	.1996	.2104
Breaking-weight per sup. foot in lbs.		186.9	157.1	142.0	132.2	125.0	119.4	114.9	111.1	107.9	105.1
Weight distributed in lbs.		10	20	30	40	50	60	70	80	90	100
Breaking-weight distributed		18.69	31.43	42.60	52.87	62.50	71.66	80.44	88.91	97.12	105.1
Depth of beam in inches	2	.9228	1.097	1.214	1.305	1.380	1.444	1.501	1.552	1.598	1.641
Breadth of beam in inches		.6525	.7760	.8588	.9228	.9757	1.021	1.061	1.097	1.130	1.160
Sectional area in sup. feet		.004181	.005914	.007243	.008363	.009350	.01024	.01106	.01182	.01254	.01322
Contents in cubic feet		.004181	.005914	.007243	.008363	.009350	.01024	.01106	.01182	.01254	.01322
Weight in lbs.		.3763	.5323	.6518	.7527	.8415	.9218	.9957	1.065	1.129	1.190
Breaking-weight per sup. foot in lbs.		222.2	188.9	168.9	157.1	148.6	142.0	136.6	132.2	128.3	125.0
Weight distributed in lbs.		20	40	60	80	100	120	140	160	180	200
Breaking-weight distributed		44.45	74.76	101.3	125.7	148.6	170.4	191.3	211.4	231.0	250.0
Depth of beam in inches	3	1.251	1.487	1.646	1.769	1.870	1.958	2.034	2.104	2.166	2.224
Breadth of beam in inches		.8844	1.051	1.164	1.251	1.322	1.384	1.438	1.487	1.532	1.572
Sectional area in sup. feet		.007682	.01087	.01381	.01536	.01672	.01781	.01861	.01927	.02004	.02072
Contents in cubic feet		.007682	.01087	.01381	.01536	.01672	.01781	.01861	.01927	.02004	.02072
Weight in lbs.		1.037	1.066	1.796	2.074	2.319	2.540	2.744	2.933	3.111	3.279
Breaking-weight per sup. foot in lbs.		246.0	206.8	186.9	173.9	164.5	157.1	151.2	146.3	142.0	138.3
Weight distributed in lbs.		30	60	90	120	150	180	210	240	270	300
Breaking-weight distributed		73.80	124.1	168.2	208.7	246.7	282.9	317.6	351.0	383.4	415.0
Depth of beam in inches	4	1.552	1.846	2.043	2.195	2.321	2.429	2.524	2.610	2.688	2.760
Breadth of beam in inches		1.097	1.305	1.444	1.552	1.641	1.717	1.785	1.846	1.900	1.951
Sectional area in sup. feet		.01182	.01672	.02448	.03365	.04364	.05398	.06461	.07549	.08659	.09740
Contents in cubic feet		.01182	.01672	.02448	.03365	.04364	.05398	.06461	.07549	.08659	.09740
Weight in lbs.		2.129	3.011	3.867	4.258	4.760	5.215	5.633	6.021	6.387	6.722
Breaking-weight per sup. foot in lbs.		264.3	222.2	200.8	186.9	176.7	168.9	162.5	157.1	152.6	148.6
Weight distributed in lbs.		40	80	120	160	200	240	280	320	360	400
Breaking-weight distributed		105.7	177.9	241.0	299.0	353.5	405.3	455.0	502.9	549.4	594.6
Depth of beam in inches	5	1.835	2.182	2.415	2.595	2.744	2.872	2.984	3.086	3.178	3.263
Breadth of beam in inches		1.298	1.542	1.707	1.834	1.940	2.030	2.110	2.182	2.247	2.307
Sectional area in sup. feet		.01653	.02337	.03263	.04365	.05666	.07149	.08813	.01065	.01259	.01466
Contents in cubic feet		.01653	.02337	.03263	.04365	.05666	.07149	.08813	.01065	.01259	.01466
Weight in lbs.		3.719	5.259	6.442	7.438	8.316	9.110	9.841	10.51	11.15	11.76
Breaking-weight per sup. foot in lbs.		279.5	235.0	212.4	197.6	186.9	178.5	171.8	166.2	161.3	157.1
Weight distributed in lbs.		50	100	150	200	250	300	350	400	450	500
Breaking-weight distributed		139.7	235.0	318.5	395.3	467.2	535.7	601.4	664.7	726.2	785.9
Depth of beam in inches	6	2.104	2.502	2.768	2.975	3.146	3.292	3.422	3.538	3.644	3.741
Breadth of beam in inches		1.487	1.769	1.957	2.103	2.224	2.328	2.419	2.501	2.577	2.645
Sectional area in sup. feet		.02173	.03073	.04363	.06046	.08146	.01065	.01349	.01646	.01951	.02266
Contents in cubic feet		.02173	.03073	.04363	.06046	.08146	.01065	.01349	.01646	.01951	.02266
Weight in lbs.		5.867	8.298	10.17	11.73	13.12	14.37	15.53	16.59	17.60	18.55
Breaking-weight per sup. foot in lbs.		292.5	246.0	222.2	206.8	195.6	186.9	179.8	173.0	168.9	164.5
Weight distributed in lbs.		60	120	180	240	300	360	420	480	540	600
Breaking-weight distributed		175.5	295.2	400.1	496.5	586.9	672.9	755.4	834.9	912.1	987.1
Depth of beam in inches	7	2.361	2.808	3.108	3.339	3.531	3.696	3.841	3.971	4.090	4.199
Breadth of beam in inches		1.639	1.985	2.197	2.361	2.496	2.613	2.716	2.808	2.892	2.969
Sectional area in sup. feet		.02738	.03873	.05443	.07476	.01023	.01307	.01607	.01924	.02259	.02614
Contents in cubic feet		.02738	.03873	.05443	.07476	.01023	.01307	.01607	.01924	.02259	.02614
Weight in lbs.		10.16	14.19	17.94	21.49	24.88	28.08	31.12	34.06	36.83	39.46
Breaking-weight per sup. foot in lbs.		304.0	255.6	231.0	214.9	203.3	194.2	186.9	180.8	175.5	170.9
Weight distributed in lbs.		70	140	210	280	350	420	490	560	630	700
Breaking-weight distributed		212.9	357.9	485.1	602.0	711.6	815.9	915.9	1012	1105	1197
Depth of beam in inches	8	2.610	3.104	3.435	3.691	3.903	4.085	4.246	4.390	4.521	4.641
Breadth of beam in inches		1.846	2.195	2.429	2.610	2.760	2.888	3.002	3.104	3.196	3.282
Sectional area in sup. feet		.03345	.04732	.06595	.09091	.01241	.01595	.02061	.02639	.03329	.04124
Contents in cubic feet		.03345	.04732	.06595	.09091	.01241	.01595	.02061	.02639	.03329	.04124
Weight in lbs.		11.98	17.03	20.86	24.09	26.93	29.50	31.87	34.06	36.13	38.08
Breaking-weight per sup. foot in lbs.		314.3	264.3	238.8	222.2	210.2	200.8	193.2	186.9	181.4	176.7
Weight distributed in lbs.		80	160	240	320	400	480	560	640	720	800
Breaking-weight distributed		251.5	422.9	573.2	711.3	840.9	964.1	1082	1196	1307	1414
Depth of beam in inches	9	2.851	3.391	3.753	4.126	4.264	4.462	4.638	4.795	4.938	5.070
Breadth of beam in inches		2.016	2.397	2.653	2.852	3.014	3.156	3.279	3.390	3.492	3.585
Sectional area in sup. feet		.03992	.05645	.07822	.01094	.01484	.01978	.02586	.03309	.04147	.05099
Contents in cubic feet		.03992	.05645	.07822	.01094	.01484	.01978	.02586	.03309	.04147	.05099
Weight in lbs.		16.16	22.86	28.00	32.33	36.15	39.60	42.77	45.72	48.50	51.12
Breaking-weight per sup. foot in lbs.		323.7	272.2	246.0	228.9	216.9	206.8	199.0	192.5	186.9	182.0
Weight distributed in lbs.		90	180	270	360	450	540	630	720	810	900
Breaking-weight distributed		291.3	490.0	664.2	824.2	974.2	1117	1254	1386	1514	1638
Depth of beam in inches	10	3.086	3.670	4.061	4.364	4.614	4.829	5.019	5.189	5.345	5.487
Breadth of beam in inches		2.182	2.595	2.871	3.085	3.262	3.414	3.549	3.669	3.779	3.880
Sectional area in sup. feet		.04675	.06612	.09098	.01281	.01745	.02321	.03009	.03809	.04721	.05754
Contents in cubic feet		.04675	.06612	.09098	.01281	.01745	.02321	.03009	.03809	.04721	.05754
Weight in lbs.		21.04	29.75	36.44	42.08	47.04	51.53	55.66	59.50	63.12	66.53
Breaking-weight per sup. foot in lbs.		332.3	279.5	252.5	235.0	222.2	212.4	204.3	197.6	191.9	186.9
Weight distributed in lbs.		100	200	300	400	500	600	700	800	900	1000
Breaking-weight distributed		332.4	559.0	757.7	940.2	1111	1274	1430	1581	1727	1869

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b=800$$

$$E_a=3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10
Depth of beam in inches	1	9993	1022	1042	1061	1080	1097	1114	1130	1146	1160
Breadth of beam in inches		7066	7221	7367	7505	7635	7760	7878	7992	8100	8205
Sectional area in sup. feet		004903	005121	005330	005532	005726	005914	006096	006273	006444	006612
Contents in cubic feet		004903	005121	005330	005532	005726	005914	006096	006273	006444	006612
Weight in lbs.		2206	2304	2394	2480	2567	2651	2733	2812	2890	2975
Breaking-weight per sup. foot in lbs.		102.6	100.4	98.44	96.63	94.98	93.45	92.05	90.74	89.52	88.36
Weight distributed in lbs.		110	120	130	140	150	160	170	180	190	200
Breaking-weight distributed in lbs.		112.9	120.6	128.0	135.3	142.4	149.5	156.4	163.4	170.1	176.7
Depth of beam in inches	2	1680	1718	1752	1785	1816	1846	1874	1901	1927	1951
Breadth of beam in inches		1188	1214	1239	1262	1284	1305	1325	1344	1362	1380
Sectional area in sup. feet		01387	01451	01507	01564	01619	01672	01724	01775	01823	01870
Contents in cubic feet		02774	02897	03015	03129	03239	03345	03448	03548	03645	03740
Weight in lbs.		1248	1304	1356	1408	1457	1505	1551	1596	1640	1683
Breaking-weight per sup. foot in lbs.		122.0	119.4	117.0	114.9	112.9	111.1	109.4	107.9	106.5	105.1
Weight distributed in lbs.		220	240	260	280	300	320	340	360	380	400
Breaking-weight distributed in lbs.		268.5	286.6	304.3	321.7	338.8	355.7	372.1	388.5	404.6	420.4
Depth of beam in inches	3	2278	2328	2375	2420	2462	2502	2540	2577	2611	2645
Breadth of beam in inches		1611	1646	1679	1711	1740	1769	1796	1821	1846	1870
Sectional area in sup. feet		02548	02661	02770	02874	02975	03073	03169	03263	03354	03443
Contents in cubic feet		07644	07983	08315	08643	08967	09289	09608	09923	10235	10544
Weight in lbs.		3439	3592	3739	3880	4016	4148	4276	4400	4520	4638
Breaking-weight per sup. foot in lbs.		135.0	132.2	129.5	127.1	125.0	123.1	121.1	119.4	117.8	116.3
Weight distributed in lbs.		330	360	390	420	450	480	510	540	570	600
Breaking-weight distributed in lbs.		445.7	475.8	505.2	534.1	562.5	590.4	617.8	644.9	671.6	697.9
Depth of beam in inches	4	2926	2989	3047	3102	3154	3204	3251	3297	3341	3382
Breadth of beam in inches		1998	2042	2083	2122	2159	2194	2228	2260	2291	2320
Sectional area in sup. feet		03923	04097	04264	04425	04581	04731	04876	05018	05155	05289
Contents in cubic feet		1569	1639	1697	1751	1803	1853	1900	1946	1990	2032
Weight in lbs.		7061	7375	7676	7966	8245	8516	8778	9032	9280	9521
Breaking-weight per sup. foot in lbs.		145.1	142.0	139.2	136.6	134.3	132.2	130.1	128.3	126.6	124.9
Weight distributed in lbs.		440	480	520	560	600	640	680	720	760	800
Breaking-weight distributed in lbs.		638.6	681.7	723.9	765.2	805.9	845.9	885.2	924.0	962.2	1000
Depth of beam in inches	5	3341	3415	3484	3549	3611	3670	3725	3779	3831	3880
Breadth of beam in inches		2362	2414	2463	2509	2553	2595	2634	2672	2708	2743
Sectional area in sup. feet		05482	05723	05959	06190	06416	06637	06853	07065	07272	07475
Contents in cubic feet		2741	2863	2979	3092	3200	3307	3407	3506	3602	3696
Weight in lbs.		1234	1289	1340	1391	1440	1487	1533	1578	1621	1663
Breaking-weight per sup. foot in lbs.		153.5	150.1	147.2	144.5	142.0	139.7	137.6	135.7	133.8	132.2
Weight distributed in lbs.		550	600	650	700	750	800	850	900	950	1000
Breaking-weight distributed in lbs.		844.1	901.0	956.7	1011.1	1065.7	1119.8	1173.5	1226.8	1279.7	1332.2
Depth of beam in inches	6	3831	3915	3994	4078	4140	4207	4270	4333	4392	4449
Breadth of beam in inches		2709	2768	2824	2877	2927	2975	3022	3068	3113	3155
Sectional area in sup. feet		07207	07527	07843	08156	08466	08772	09075	09375	09672	09967
Contents in cubic feet		4324	4516	4701	4879	5049	5215	5379	5541	5699	5854
Weight in lbs.		1946	2033	2114	2195	2276	2356	2434	2511	2587	2662
Breaking-weight per sup. foot in lbs.		160.6	157.1	154.0	151.2	148.6	146.3	144.0	142.0	140.1	138.3
Weight distributed in lbs.		660	720	780	840	900	960	1020	1080	1140	1200
Breaking-weight distributed in lbs.		1069	1131	1201	1270	1337	1404	1469	1534	1597	1660
Depth of beam in inches	7	4301	4395	4484	4568	4647	4723	4795	4864	4930	4994
Breadth of beam in inches		3041	3107	3170	3230	3286	3339	3390	3439	3486	3531
Sectional area in sup. feet		09082	09485	09883	10276	10664	11047	11425	11797	12163	12523
Contents in cubic feet		5357	5639	5911	6172	6423	6673	6921	7168	7413	7654
Weight in lbs.		2840	2987	3130	3270	3407	3541	3673	3803	3930	4054
Breaking-weight per sup. foot in lbs.		169.6	165.4	161.1	157.1	153.4	149.7	146.3	143.0	140.1	137.3
Weight distributed in lbs.		770	840	910	980	1050	1120	1190	1260	1330	1400
Breaking-weight distributed in lbs.		1286	1372	1457	1540	1622	1703	1781	1860	1937	2017
Depth of beam in inches	8	4754	4858	4957	5049	5137	5220	5300	5376	5450	5520
Breadth of beam in inches		3361	3435	3504	3570	3632	3691	3747	3801	3853	3903
Sectional area in sup. feet		1110	1159	1206	1251	1295	1338	1379	1420	1458	1497
Contents in cubic feet		6877	7271	7650	8014	8373	8727	9075	9418	9754	10084
Weight in lbs.		3994	4172	4342	4506	4664	4817	4966	5110	5248	5386
Breaking-weight per sup. foot in lbs.		172.6	168.9	165.5	162.5	159.7	157.1	154.8	152.6	150.5	148.6
Weight distributed in lbs.		880	960	1040	1120	1200	1280	1360	1440	1520	1600
Breaking-weight distributed in lbs.		1519	1625	1721	1820	1916	2016	2105	2197	2288	2375
Depth of beam in inches	9	5192	5307	5414	5515	5611	5702	5789	5873	5953	6029
Breadth of beam in inches		3671	3752	3829	3900	3967	4032	4093	4152	4209	4263
Sectional area in sup. feet		1324	1383	1439	1493	1546	1596	1645	1693	1740	1785
Contents in cubic feet		1192	1245	1295	1344	1391	1437	1481	1525	1566	1606
Weight in lbs.		5302	5600	5829	6049	6261	6466	6665	6859	7047	7230
Breaking-weight per sup. foot in lbs.		177.7	173.9	170.5	167.3	164.5	161.9	159.4	157.1	155.0	153.0
Weight distributed in lbs.		990	1080	1170	1260	1350	1440	1530	1620	1710	1800
Breaking-weight distributed in lbs.		1760	1878	1994	2109	2220	2331	2439	2546	2651	2755
Depth of beam in inches	10	5620	5743	5859	5969	6072	6171	6265	6356	6442	6526
Breadth of beam in inches		3973	4061	4143	4220	4294	4363	4430	4494	4555	4614
Sectional area in sup. feet		1550	1619	1685	1749	1810	1870	1928	1983	2038	2091
Contents in cubic feet		1550	1619	1685	1749	1810	1870	1928	1983	2038	2091
Weight in lbs.		6978	7288	7585	7872	8148	8415	8674	8926	9171	9408
Breaking-weight per sup. foot in lbs.		182.5	178.5	175.0	171.8	168.9	166.2	163.7	161.3	159.2	157.1
Weight distributed in lbs.		1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Breaking-weight distributed in lbs.		2007	2143	2276	2405	2533	2659	2782	2905	3025	3143

Table No. VIII.—Burma Teak.

$$P_b=800$$

$$E_a=3900$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10
Depth of beam in inches	1	1175	1188	1202	1214	1227	1239	1251	1262	1273	1284
Breadth of beam in inches		8306	8403	8497	8588	8676	8761	8844	8925	9004	9080
Sectional area in sup. feet		006775	006935	007090	007243	007392	007539	007682	007823	007962	008098
Contents in cubic feet		006775	006935	007090	007243	007392	007539	007682	007823	007962	008098
Weight in lbs.		3048	3120	3190	3259	3326	3392	3457	3520	3582	3644
Breaking-weight per sup. foot in lbs.		87.31	86.30	85.35	84.45	83.59	82.77	82.00	81.16	80.54	79.86
Weight distributed in lbs.		210	230	250	270	290	310	330	350	370	390
Breaking-weight distributed in lbs.		183.3	189.8	196.3	202.6	209.0	215.2	221.4	227.6	233.6	239.6
Depth of beam in inches	2	1976	1999	2021	2043	2063	2084	2099	2123	2141	2160
Breadth of beam in inches		1397	1413	1429	1444	1459	1473	1487	1501	1514	1526
Sectional area in sup. feet		01916	01961	02005	02048	02090	02132	02173	02213	02252	02290
Contents in cubic feet		01916	01961	02005	02048	02090	02132	02173	02213	02252	02290
Weight in lbs.		1724	1755	1784	1811	1837	1861	1884	1905	1926	1946
Breaking-weight per sup. foot in lbs.		103.8	102.6	101.5	100.4	99.4	98.4	97.4	96.3	95.78	94.98
Weight distributed in lbs.		420	440	460	480	500	520	540	560	580	600
Breaking-weight distributed in lbs.		436.1	451.5	466.9	482.0	497.0	511.8	526.5	541.1	555.5	569.8

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b=800$$

$$E_d=3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		3'1	3'2	3'3	3'4	3'5	3'6	3'7	3'8	3'9	4'0
Depth of beam in inches	1'	1'295	1'305	1'315	1'325	1'335	1'344	1'353	1'362	1'371	1'380
Breadth of beam in inches		9'155	9'228	9'299	9'369	9'437	9'504	9'569	9'633	9'696	9'757
Sectional area in sup. feet		0'08232	0'08364	0'08493	0'08621	0'08746	0'08871	0'08993	0'09114	0'09233	0'09350
Contents in cubic feet		0'08232	0'08364	0'08493	0'08621	0'08746	0'08871	0'08993	0'09114	0'09233	0'09350
Weight in lbs.		3'704	3'763	3'822	3'879	3'936	3'991	4'047	4'101	4'154	4'208
Breaking-weight per sup. foot in lbs.	2'	79'21	78'85	77'99	77'40	76'85	76'31	75'78	75'28	74'79	74'32
Weight distributed in lbs.		310	320	330	340	350	360	370	380	390	400
Breaking-weight distributed		245'5	251'5	257'3	263'1	268'7	274'7	280'4	286'0	291'7	297'3
Depth of beam in inches		2'177	2'194	2'212	2'238	2'245	2'260	2'276	2'291	2'306	2'320
Breadth of beam in inches		1'590	1'552	1'564	1'575	1'587	1'598	1'609	1'620	1'630	1'641
Sectional area in sup. feet	3'	0'2329	0'2365	0'2402	0'2438	0'2473	0'2509	0'2543	0'2577	0'2611	0'2644
Contents in cubic feet		0'4656	0'4731	0'4804	0'4876	0'4947	0'5017	0'5087	0'5155	0'5222	0'5289
Weight in lbs.		2'095	2'120	2'145	2'169	2'194	2'218	2'242	2'266	2'290	2'314
Breaking-weight per sup. foot in lbs.		94'20	93'45	92'74	92'05	91'39	90'74	90'12	89'53	88'95	88'39
Weight distributed in lbs.		620	640	660	680	700	720	740	760	780	800
Breaking-weight distributed		584'0	598'1	612'1	625'9	639'6	653'3	666'9	680'3	693'7	707'0
Depth of beam in inches	4'	2'952	2'975	2'998	3'028	3'042	3'064	3'085	3'105	3'126	3'138
Breadth of beam in inches		2'087	2'103	2'119	2'135	2'151	2'166	2'181	2'196	2'210	2'224
Sectional area in sup. feet		0'4277	0'4346	0'4413	0'4479	0'4545	0'4609	0'4673	0'4735	0'4798	0'4858
Contents in cubic feet		1'283	1'304	1'324	1'344	1'363	1'382	1'402	1'420	1'439	1'457
Weight in lbs.		5'774	5'867	5'957	6'047	6'135	6'222	6'308	6'393	6'476	6'559
Breaking-weight per sup. foot in lbs.	5'	104'3	103'4	102'5	101'6	100'7	99'74	98'78	97'82	96'86	95'90
Weight distributed in lbs.		930	960	990	1020	1050	1080	1110	1140	1170	1200
Breaking-weight distributed		969'5	992'9	1016'	1039'	1062'	1084'	1107'	1129'	1151'	1173'
Depth of beam in inches		3'682	3'691	3'720	3'748	3'775	3'801	3'818	3'833	3'848	3'863
Breadth of beam in inches		2'589	2'610	2'631	2'650	2'669	2'688	2'706	2'724	2'742	2'759
Sectional area in sup. feet	6'	0'6585	0'6691	0'6794	0'6897	0'6997	0'7096	0'7195	0'7291	0'7386	0'7480
Contents in cubic feet		2'634	2'676	2'718	2'758	2'799	2'838	2'878	2'916	2'954	2'993
Weight in lbs.		11'85	12'04	12'23	12'41	12'59	12'77	12'95	13'13	13'30	13'46
Breaking-weight per sup. foot in lbs.		112'0	111'1	110'2	109'3	108'4	107'5	106'5	105'7	104'8	103'9
Weight distributed in lbs.		1240	1280	1320	1360	1400	1440	1480	1520	1560	1600
Breaking-weight distributed		1389'	1423'	1456'	1488'	1521'	1553'	1586'	1619'	1650'	1681'
Depth of beam in inches	7'	4'330	4'364	4'398	4'430	4'463	4'494	4'525	4'555	4'585	4'614
Breadth of beam in inches		3'061	3'085	3'109	3'132	3'156	3'177	3'199	3'222	3'242	3'262
Sectional area in sup. feet		0'9203	0'9350	0'9495	0'9639	0'9778	0'9917	1'005	1'019	1'032	1'045
Contents in cubic feet		4'601	4'675	4'747	4'819	4'889	4'958	5'027	5'094	5'161	5'227
Weight in lbs.		20'71	21'04	21'36	21'68	22'00	22'31	22'62	22'92	23'22	23'52
Breaking-weight per sup. foot in lbs.	8'	118'4	117'5	116'6	115'7	114'9	114'1	113'2	112'3	111'4	110'5
Weight distributed in lbs.		1550	1600	1650	1700	1750	1800	1850	1900	1950	2000
Breaking-weight distributed		1836'	1880'	1924'	1967'	2010'	2053'	2096'	2138'	2181'	2223'
Depth of beam in inches		4'964	5'003	5'042	5'080	5'116	5'153	5'188	5'223	5'257	5'290
Breadth of beam in inches		3'508	3'537	3'565	3'591	3'616	3'643	3'668	3'693	3'717	3'740
Sectional area in sup. feet	9'	1'290	1'299	1'308	1'317	1'326	1'335	1'344	1'353	1'362	1'371
Contents in cubic feet		7'250	7'375	7'499	7'622	7'744	7'865	7'984	8'102	8'219	8'335
Weight in lbs.		32'36	33'19	34'01	34'81	35'60	36'38	37'16	37'94	38'71	39'48
Breaking-weight per sup. foot in lbs.		123'0	122'0	121'0	120'0	119'0	118'0	117'0	116'0	115'0	114'0
Weight distributed in lbs.		1860	1920	1980	2040	2100	2160	2220	2280	2340	2400
Breaking-weight distributed		2306'	2361'	2416'	2471'	2525'	2579'	2633'	2686'	2739'	2791'
Depth of beam in inches	10'	5'572	5'616	5'660	5'702	5'744	5'784	5'823	5'863	5'901	5'938
Breadth of beam in inches		3'940	3'971	4'002	4'032	4'061	4'090	4'118	4'145	4'172	4'199
Sectional area in sup. feet		1'525	1'549	1'573	1'596	1'619	1'642	1'665	1'687	1'711	1'734
Contents in cubic feet		1'067	1'084	1'101	1'117	1'134	1'150	1'166	1'181	1'197	1'212
Weight in lbs.		48'02	48'79	49'55	50'29	51'02	51'75	52'46	53'17	53'86	54'55
Breaking-weight per sup. foot in lbs.	11'	128'9	127'8	126'8	125'9	125'0	124'1	123'2	122'3	121'4	120'5
Weight distributed in lbs.		2170	2240	2310	2380	2450	2520	2590	2660	2730	2800
Breaking-weight distributed		2796'	2860'	2924'	2987'	3050'	3112'	3174'	3235'	3296'	3356'
Depth of beam in inches		6'159	6'208	6'256	6'303	6'349	6'394	6'438	6'481	6'523	6'564
Breadth of beam in inches		4'356	4'389	4'423	4'457	4'489	4'521	4'552	4'582	4'612	4'641
Sectional area in sup. feet	12'	1'893	1'893	1'921	1'950	1'979	2'007	2'035	2'062	2'089	2'115
Contents in cubic feet		1'490	1'514	1'537	1'560	1'583	1'606	1'628	1'650	1'672	1'692
Weight in lbs.		67'06	68'13	69'20	70'23	71'25	72'26	73'26	74'24	75'21	76'17
Breaking-weight per sup. foot in lbs.		137'2	136'2	135'1	134'0	132'9	131'8	130'7	129'6	128'5	127'4
Weight distributed in lbs.		2480	2560	2640	2720	2800	2880	2960	3040	3120	3200
Breaking-weight distributed		3304'	3383'	3462'	3541'	3618'	3696'	3773'	3850'	3924'	4000'
Depth of beam in inches	13'	6'728	6'781	6'834	6'885	6'935	6'984	7'032	7'079	7'125	7'170
Breadth of beam in inches		4'757	4'795	4'832	4'868	4'903	4'938	4'972	5'005	5'038	5'070
Sectional area in sup. feet		2'232	2'258	2'283	2'307	2'331	2'355	2'378	2'401	2'424	2'446
Contents in cubic feet		2'000	2'033	2'064	2'095	2'125	2'155	2'185	2'214	2'243	2'272
Weight in lbs.		90'01	91'45	92'87	94'27	95'64	97'00	98'34	99'65	101'0	102'2
Breaking-weight per sup. foot in lbs.	14'	137'2	136'1	135'0	133'9	132'8	131'7	130'6	129'5	128'4	127'3
Weight distributed in lbs.		2790	2880	2970	3060	3150	3240	3330	3420	3510	3600
Breaking-weight distributed		3828'	3920'	4011'	4102'	4192'	4282'	4371'	4459'	4547'	4634'
Depth of beam in inches		7'281	7'339	7'396	7'451	7'474	7'558	7'610	7'661	7'711	7'760
Breadth of beam in inches		5'148	5'189	5'229	5'268	5'307	5'344	5'381	5'417	5'452	5'487
Sectional area in sup. feet	15'	2'603	2'645	2'686	2'726	2'766	2'805	2'844	2'882	2'919	2'957
Contents in cubic feet		2'603	2'645	2'686	2'726	2'766	2'805	2'844	2'882	2'919	2'957
Weight in lbs.		117'1	119'0	120'8	122'6	124'5	126'2	128'0	129'6	131'3	133'1
Breaking-weight per sup. foot in lbs.		140'8	139'7	138'7	137'6	136'6	135'7	134'7	133'8	132'9	132'0
Weight distributed in lbs.		3100	3200	3300	3400	3500	3600	3700	3800	3900	4000
Breaking-weight distributed		4367'	4472'	4576'	4680'	4782'	4885'	4986'	5087'	5187'	5286'

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b=800$$

$$E_d=3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			4'1	4'2	4'3	4'4	4'5	4'6	4'7	4'8	4'9	5'0
Depth of beam	in inches	1'	1'388	1'397	1'405	1'413	1'421	1'429	1'436	1'444	1'451	1'459
Breadth of beam	in inches		9819	9877	9935	9993	1'005	1'010	1'016	1'021	1'026	1'031
Sectional area	in sup. feet		0'09467	0'09581	0'09695	0'09807	0'09918	0'10003	0'10103	0'10204	0'10305	0'10405
Contents	in cubic feet		0'09467	0'09581	0'09695	0'09807	0'09918	0'10003	0'10103	0'10204	0'10305	0'10405
Weight	in lbs.		4260	4311	4362	4413	4463	4512	4561	4607	4657	4704
Breaking-weight per sup. foot	in lbs.		73'87	73'42	72'99	72'57	72'16	71'77	71'38	71'01	70'64	70'29
Weight distributed	in lbs.		410	420	430	440	450	460	470	480	490	500
Breaking-weight distributed	...	302'8	308'4	313'8	319'3	324'7	330'1	335'5	340'8	345'1	351'4	
Depth of beam	in inches	2'	2'335	2'349	2'363	2'376	2'390	2'403	2'416	2'429	2'441	2'454
Breadth of beam	in inches		1'631	1'661	1'671	1'680	1'690	1'699	1'708	1'717	1'726	1'735
Sectional area	in sup. feet		0'2677	0'2774	0'2871	0'2974	0'3080	0'3186	0'3292	0'3397	0'3502	0'3606
Contents	in cubic feet		0'5355	0'5421	0'5487	0'5547	0'5610	0'5672	0'5733	0'5795	0'5854	0'5913
Weight	in lbs.		2'409	2'439	2'467	2'496	2'524	2'552	2'580	2'607	2'634	2'661
Breaking-weight per sup. foot	in lbs.		87'84	87'31	86'80	86'30	85'82	85'35	84'89	84'45	84'01	83'59
Weight distributed	in lbs.		820	840	860	880	900	920	940	960	980	1000
Breaking-weight distributed	...	730'2	733'4	740'5	759'4	772'3	785'3	797'9	810'7	823'3	835'9	
Depth of beam	in inches	3'	3'165	3'185	3'203	3'222	3'239	3'257	3'275	3'292	3'309	3'326
Breadth of beam	in inches		2'238	2'251	2'265	2'278	2'290	2'303	2'315	2'328	2'340	2'352
Sectional area	in sup. feet		0'4919	0'4973	0'5037	0'5096	0'5153	0'5210	0'5266	0'5322	0'5377	0'5432
Contents	in cubic feet		1'0416	1'048	1'051	1'058	1'064	1'071	1'078	1'084	1'091	1'098
Weight	in lbs.		6'640	6'721	6'800	6'879	6'957	7'034	7'110	7'185	7'260	7'333
Breaking-weight per sup. foot	in lbs.		97'21	96'63	96'06	95'51	94'98	94'45	93'95	93'45	92'97	92'51
Weight distributed	in lbs.		1230	1260	1290	1320	1350	1380	1410	1440	1470	1500
Breaking-weight distributed	...	1195'	1217'	1239'	1260'	1282'	1304'	1325'	1345'	1366'	1387'	
Depth of beam	in inches	4'	3'927	3'951	3'974	3'997	4'019	4'041	4'063	4'085	4'106	4'127
Breadth of beam	in inches		2'777	2'793	2'810	2'826	2'842	2'858	2'873	2'888	2'903	2'918
Sectional area	in sup. feet		0'7373	0'7435	0'7500	0'7565	0'7634	0'7702	0'7770	0'7838	0'7906	0'7973
Contents	in cubic feet		1'363	1'379	1'396	1'412	1'428	1'444	1'459	1'475	1'490	1'505
Weight	in lbs.		10'44	10'63	10'82	11'02	11'20	11'39	11'58	11'77	11'96	12'15
Breaking-weight per sup. foot	in lbs.		1640	1680	1720	1760	1800	1840	1880	1920	1960	2000
Weight distributed	in lbs.		1713'	1744'	1775'	1806'	1837'	1867'	1898'	1928'	1958'	1988'
Breaking-weight distributed	...	1713'	1744'	1775'	1806'	1837'	1867'	1898'	1928'	1958'	1988'	
Depth of beam	in inches	5'	4'642	4'670	4'698	4'725	4'752	4'778	4'804	4'829	4'854	4'878
Breadth of beam	in inches		3'283	3'302	3'323	3'341	3'359	3'377	3'394	3'411	3'428	3'445
Sectional area	in sup. feet		1'058	1'071	1'083	1'096	1'108	1'121	1'133	1'145	1'157	1'168
Contents	in cubic feet		2'292	2'322	2'352	2'382	2'412	2'442	2'472	2'502	2'532	2'562
Weight	in lbs.		11'05	11'08	11'11	11'14	11'17	11'20	11'23	11'26	11'29	11'32
Breaking-weight per sup. foot	in lbs.		2050	2100	2150	2200	2250	2300	2350	2400	2450	2500
Weight distributed	in lbs.		2264'	2305'	2346'	2387'	2428'	2468'	2508'	2548'	2589'	2627'
Breaking-weight distributed	...	2264'	2305'	2346'	2387'	2428'	2468'	2508'	2548'	2589'	2627'	
Depth of beam	in inches	6'	5'323	5'355	5'386	5'417	5'448	5'478	5'507	5'537	5'565	5'593
Breadth of beam	in inches		3'764	3'786	3'809	3'831	3'852	3'873	3'894	3'915	3'935	3'955
Sectional area	in sup. feet		1'391	1'408	1'424	1'441	1'457	1'473	1'489	1'505	1'521	1'536
Contents	in cubic feet		3'048	3'084	3'120	3'156	3'192	3'228	3'264	3'300	3'336	3'372
Weight	in lbs.		17'56	18'02	18'47	18'92	19'37	19'82	20'27	20'72	21'17	21'62
Breaking-weight per sup. foot	in lbs.		114'9	114'9	114'9	114'9	114'9	114'9	114'9	114'9	114'9	114'9
Weight distributed	in lbs.		2490	2520	2550	2580	2610	2640	2670	2700	2730	2760
Breaking-weight distributed	...	2844'	2896'	2947'	2998'	3049'	3100'	3150'	3201'	3251'	3300'	
Depth of beam	in inches	7'	5'975	6'011	6'046	6'082	6'116	6'149	6'183	6'215	6'247	6'279
Breadth of beam	in inches		4'225	4'250	4'275	4'300	4'324	4'348	4'372	4'395	4'417	4'440
Sectional area	in sup. feet		1'753	1'775	1'795	1'816	1'837	1'857	1'877	1'897	1'916	1'936
Contents	in cubic feet		1'227	1'242	1'257	1'271	1'286	1'300	1'314	1'328	1'341	1'355
Weight	in lbs.		55'23	55'40	55'56	55'72	55'88	56'04	56'19	56'34	56'49	56'64
Breaking-weight per sup. foot	in lbs.		120'1	119'4	118'7	118'1	117'3	116'7	116'1	115'5	114'9	114'3
Weight distributed	in lbs.		2870	2940	3010	3080	3150	3220	3290	3360	3430	3500
Breaking-weight distributed	...	3448'	3511'	3573'	3635'	3697'	3759'	3820'	3881'	3941'	4001'	
Depth of beam	in inches	8'	6'604	6'644	6'684	6'722	6'760	6'797	6'833	6'870	6'906	6'940
Breadth of beam	in inches		4'670	4'698	4'726	4'754	4'780	4'806	4'832	4'858	4'883	4'908
Sectional area	in sup. feet		2'142	2'168	2'193	2'219	2'244	2'269	2'293	2'318	2'342	2'365
Contents	in cubic feet		1'713	1'734	1'755	1'775	1'795	1'815	1'835	1'854	1'873	1'893
Weight	in lbs.		77'12	78'05	78'98	79'89	80'79	81'68	82'57	83'44	84'31	85'16
Breaking-weight per sup. foot	in lbs.		124'2	123'4	122'8	122'0	121'4	120'7	120'0	119'4	118'8	118'2
Weight distributed	in lbs.		3280	3360	3440	3520	3600	3680	3760	3840	3920	4000
Breaking-weight distributed	...	4074'	4149'	4222'	4296'	4369'	4442'	4514'	4586'	4657'	4728'	
Depth of beam	in inches	9'	7'214	7'258	7'301	7'343	7'384	7'425	7'469	7'504	7'543	7'581
Breadth of beam	in inches		5'101	5'132	5'162	5'192	5'221	5'250	5'278	5'306	5'334	5'361
Sectional area	in sup. feet		2'502	2'537	2'571	2'604	2'637	2'670	2'702	2'735	2'767	2'800
Contents	in cubic feet		2'300	2'329	2'358	2'387	2'416	2'445	2'473	2'502	2'530	2'558
Weight	in lbs.		103'6	104'8	106'0	107'2	108'4	109'7	110'8	111'9	112'9	113'9
Breaking-weight per sup. foot	in lbs.		128'0	127'1	126'4	125'7	125'0	124'3	123'6	122'9	122'3	121'7
Weight distributed	in lbs.		3690	3780	3870	3960	4050	4150	4230	4320	4410	4500
Breaking-weight distributed	...	4721'	4807'	4892'	4978'	5062'	5146'	5230'	5313'	5396'	5478'	
Depth of beam	in inches	10'	7'808	7'855	7'901	7'947	7'991	8'036	8'079	8'122	8'164	8'205
Breadth of beam	in inches		5'521	5'554	5'587	5'619	5'651	5'682	5'713	5'743	5'772	5'802
Sectional area	in sup. feet		2'993	3'030	3'065	3'101	3'136	3'171	3'205	3'239	3'272	3'306
Contents	in cubic feet		2'593	2'630	2'665	2'700	2'734	2'768	2'802	2'835	2'868	2'901
Weight	in lbs.		131'3	130'5	129'8	129'0	128'3	127'6	126'9	126'2	125'5	124'8
Breaking-weight per sup. foot	in lbs.		1400	1420	1430	1440	1450	1460	1470	1480	1490	1500
Weight distributed	in lbs.		4100	4200	4300	4400	4500	4600	4700	4800	4900	5000
Breaking-weight distributed	...	5385'	5484'	5581'	5678'	5775'	5871'	5966'	6061'	6156'	6250'	

14

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre—S.									
		5'1	5'2	5'3	5'4	5'5	5'6	5'7	5'8	5'9	6'0
Depth of beam in inches	1	1'466	1'478	1'480	1'487	1'494	1'501	1'507	1'514	1'521	1'527
Breadth of beam in inches		1'036	1'042	1'047	1'051	1'056	1'061	1'066	1'070	1'075	1'079
Sectional area in sup. feet		0'1055	0'1066	0'1076	0'1087	0'1097	0'1106	0'1116	0'1126	0'1136	0'1145
Contents in cubic feet		0'1055	0'1066	0'1076	0'1087	0'1097	0'1106	0'1116	0'1126	0'1136	0'1145
Weight in lbs.		4751	4798	4843	4889	4934	4978	5023	5066	5110	5153
Breaking-weight per sup. foot in lbs.	2	69'94	69'60	69'27	68'95	68'63	68'33	68'02	67'73	67'44	67'11
Weight distributed in lbs.		510	520	530	540	550	560	570	580	590	600
Breaking-weight distributed in lbs.		356'7	361'9	367'1	372'3	377'5	382'6	387'7	392'8	396'2	402'9
Depth of beam in inches		2'467	2'478	2'490	2'501	2'513	2'524	2'536	2'546	2'557	2'568
Breadth of beam in inches		1'743	1'752	1'760	1'769	1'777	1'785	1'793	1'800	1'808	1'816
Sectional area in sup. feet	3	0'2086	0'2095	0'2104	0'2113	0'2122	0'2131	0'2140	0'2149	0'2158	0'2167
Contents in cubic feet		0'2086	0'2095	0'2104	0'2113	0'2122	0'2131	0'2140	0'2149	0'2158	0'2167
Weight in lbs.		89'18	89'60	90'02	90'44	90'86	91'28	91'70	92'12	92'54	92'96
Breaking-weight per sup. foot in lbs.		1020	1040	1060	1080	1100	1120	1140	1160	1180	1200
Weight distributed in lbs.		848'4	860'8	873'2	885'6	897'8	910'0	922'2	934'3	946'3	958'4
Depth of beam in inches	4	3'342	3'358	3'374	3'390	3'406	3'421	3'436	3'452	3'466	3'481
Breadth of beam in inches		2'363	2'375	2'386	2'397	2'408	2'419	2'430	2'441	2'451	2'461
Sectional area in sup. feet		0'5486	0'5540	0'5593	0'5646	0'5699	0'5752	0'5805	0'5858	0'5911	0'5964
Contents in cubic feet		0'5486	0'5540	0'5593	0'5646	0'5699	0'5752	0'5805	0'5858	0'5911	0'5964
Weight in lbs.		1646	1662	1678	1693	1709	1724	1740	1755	1771	1785
Breaking-weight per sup. foot in lbs.	5	74'06	74'73	75'50	76'21	76'92	77'63	78'34	79'05	79'76	80'47
Weight distributed in lbs.		92'05	91'60	91'17	90'74	90'33	89'93	89'53	89'14	88'76	88'38
Breaking-weight distributed in lbs.		1530	1560	1590	1620	1650	1680	1710	1740	1770	1800
Depth of beam in inches		4'147	4'167	4'187	4'207	4'226	4'245	4'264	4'283	4'301	4'319
Breadth of beam in inches		2'937	2'947	2'961	2'975	2'988	2'999	3'012	3'025	3'038	3'051
Sectional area in sup. feet	6	0'8447	0'8529	0'8611	0'8692	0'8772	0'8852	0'8931	0'9010	0'9089	0'9168
Contents in cubic feet		0'8447	0'8529	0'8611	0'8692	0'8772	0'8852	0'8931	0'9010	0'9089	0'9168
Weight in lbs.		2378	2411	2444	2476	2509	2541	2573	2605	2637	2669
Breaking-weight per sup. foot in lbs.		108'91	109'43	109'95	110'47	110'99	111'51	112'03	112'55	113'07	113'59
Weight distributed in lbs.		2040	2080	2120	2160	2200	2240	2280	2320	2360	2400
Breaking-weight distributed in lbs.	7	2017	2047	2077	2107	2137	2167	2197	2227	2257	2287
Depth of beam in inches		4'903	4'927	4'950	4'973	4'996	5'019	5'041	5'063	5'085	5'106
Breadth of beam in inches		3'407	3'424	3'440	3'457	3'473	3'489	3'505	3'520	3'536	3'551
Sectional area in sup. feet		1'181	1'192	1'203	1'214	1'225	1'236	1'247	1'258	1'269	1'280
Contents in cubic feet		1'181	1'192	1'203	1'214	1'225	1'236	1'247	1'258	1'269	1'280
Weight in lbs.	8	5003	5059	5115	5171	5227	5283	5339	5395	5451	5507
Breaking-weight per sup. foot in lbs.		20'55	20'81	21'07	21'33	21'59	21'85	22'11	22'37	22'63	22'89
Weight distributed in lbs.		104'5	104'0	103'6	103'1	102'6	102'1	101'7	101'2	100'8	100'4
Breaking-weight distributed in lbs.		2550	2600	2650	2700	2750	2800	2850	2900	2950	3000
Depth of beam in inches		5'621	5'648	5'675	5'702	5'728	5'755	5'780	5'805	5'830	5'854
Breadth of beam in inches	9	3'975	3'994	4'013	4'032	4'050	4'068	4'087	4'104	4'122	4'139
Sectional area in sup. feet		1'551	1'567	1'583	1'599	1'615	1'631	1'647	1'663	1'679	1'695
Contents in cubic feet		1'551	1'567	1'583	1'599	1'615	1'631	1'647	1'663	1'679	1'695
Weight in lbs.		4190	4230	4270	4311	4351	4390	4429	4468	4506	4544
Breaking-weight per sup. foot in lbs.		109'4	108'9	108'4	107'9	107'4	106'9	106'5	106'0	105'5	105'1
Weight distributed in lbs.	10	3060	3120	3180	3240	3300	3360	3420	3480	3540	3600
Breaking-weight distributed in lbs.		3350	3399	3448	3496	3545	3593	3641	3689	3736	3784
Depth of beam in inches		6'310	6'341	6'371	6'401	6'430	6'459	6'488	6'517	6'544	6'572
Breadth of beam in inches		4'462	4'484	4'505	4'526	4'547	4'567	4'588	4'608	4'627	4'647
Sectional area in sup. feet		1'955	1'974	1'993	2'012	2'030	2'049	2'067	2'085	2'103	2'121
Contents in cubic feet		1'955	1'974	1'993	2'012	2'030	2'049	2'067	2'085	2'103	2'121
Weight in lbs.	11	5139	5182	5225	5268	5311	5353	5395	5437	5479	5521
Breaking-weight per sup. foot in lbs.		113'8	113'2	112'6	112'1	111'6	111'1	110'6	110'2	109'7	109'2
Weight distributed in lbs.		3570	3640	3710	3780	3850	3920	3990	4060	4130	4200
Breaking-weight distributed in lbs.		4061	4121	4180	4239	4298	4356	4415	4472	4530	4588
Depth of beam in inches	12	6'975	7'009	7'042	7'075	7'108	7'140	7'172	7'203	7'234	7'264
Breadth of beam in inches		4'932	4'956	4'980	4'999	5'018	5'037	5'056	5'074	5'093	5'111
Sectional area in sup. feet		2'389	2'412	2'435	2'458	2'481	2'503	2'525	2'547	2'569	2'591
Contents in cubic feet		2'389	2'412	2'435	2'458	2'481	2'503	2'525	2'547	2'569	2'591
Weight in lbs.		5801	5848	5895	5941	5987	6033	6079	6125	6171	6217
Breaking-weight per sup. foot in lbs.	13	117'6	117'0	116'5	116'0	115'4	114'9	114'4	113'9	113'4	112'9
Weight distributed in lbs.		4080	4160	4240	4320	4400	4480	4560	4640	4720	4800
Breaking-weight distributed in lbs.		4799	4870	4940	5010	5079	5148	5217	5285	5353	5422
Depth of beam in inches		7'619	7'656	7'693	7'729	7'764	7'799	7'835	7'868	7'902	7'935
Breadth of beam in inches		5'387	5'414	5'440	5'465	5'490	5'515	5'539	5'563	5'587	5'611
Sectional area in sup. feet	14	2'850	2'878	2'906	2'933	2'960	2'987	3'014	3'040	3'066	3'092
Contents in cubic feet		2'850	2'878	2'906	2'933	2'960	2'987	3'014	3'040	3'066	3'092
Weight in lbs.		7263	7310	7357	7404	7451	7497	7544	7590	7637	7683
Breaking-weight per sup. foot in lbs.		121'4	120'6	119'8	119'0	118'2	117'4	116'6	115'8	115'0	114'2
Weight distributed in lbs.		4590	4680	4770	4860	4950	5040	5130	5220	5310	5400
Breaking-weight distributed in lbs.	15	5500	5642	5783	5924	6064	6204	6344	6484	6624	6764
Depth of beam in inches		8'246	8'286	8'325	8'364	8'402	8'441	8'478	8'515	8'552	8'588
Breadth of beam in inches		5'830	5'859	5'887	5'914	5'942	5'969	5'995	6'021	6'047	6'072
Sectional area in sup. feet		3'339	3'371	3'403	3'436	3'468	3'498	3'528	3'558	3'587	3'616
Contents in cubic feet		3'339	3'371	3'403	3'436	3'468	3'498	3'528	3'558	3'587	3'616
Weight in lbs.	16	150'2	151'8	153'2	154'6	156'0	157'4	158'8	160'2	161'6	163'0
Breaking-weight per sup. foot in lbs.		124'3	123'7	123'1	122'5	121'9	121'3	120'7	120'1	119'5	118'9
Weight distributed in lbs.		5100	5200	5300	5400	5500	5600	5700	5800	5900	6000
Breaking-weight distributed in lbs.		6343	6486	6629	6771	6913	7054	7195	7336	7477	7618

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			6'1	6'2	6'3	6'4	6'5	6'6	6'7	6'8	6'9	7'0
Depth of beam	in inches	1	1'533	1'539	1'546	1'552	1'557	1'567	1'573	1'579	1'582	1'587
Breadth of beam	in inches		1'084	1'088	1'093	1'097	1'102	1'106	1'110	1'114	1'118	1'123
Sectional area	in sup. feet		0'1154	0'1165	0'1173	0'1182	0'1192	0'1201	0'1210	0'1219	0'1228	0'1237
Contents	in cubic feet		0'1154	0'1165	0'1173	0'1182	0'1192	0'1201	0'1210	0'1219	0'1228	0'1237
Weight	in lbs.		5196	5238	5280	5322	5364	5405	5446	5486	5526	5566
Breaking-weight per sup. foot	in lbs.	2	66'61	66'61	66'34	66'08	65'83	65'58	65'33	65'09	64'85	64'62
Weight distributed	in lbs.		610	620	630	640	650	660	670	680	690	700
Breaking-weight distributed	...		407'9	413'0	417'9	422'9	427'9	432'8	437'7	442'6	447'5	452'3
Depth of beam	in inches		2'579	2'589	2'599	2'610	2'620	2'631	2'640	2'650	2'659	2'669
Breadth of beam	in inches		1'823	1'831	1'838	1'846	1'852	1'860	1'867	1'873	1'880	1'887
Sectional area	in sup. feet	3	0'3206	0'3222	0'3239	0'3255	0'3271	0'3287	0'3303	0'3319	0'3335	0'3351
Contents	in cubic feet		0'3206	0'3222	0'3239	0'3255	0'3271	0'3287	0'3303	0'3319	0'3335	0'3351
Weight	in lbs.		1220	1240	1260	1280	1300	1320	1340	1360	1380	1400
Breaking-weight per sup. foot	in lbs.		79'54	79'21	78'90	78'59	78'28	77'97	77'69	77'40	77'12	76'85
Weight distributed	in lbs.		1320	1240	1160	1080	1000	920	840	760	680	600
Breaking-weight distributed	...	977'0	982'2	994'0	1005	1017	1029	1041	1052	1065	1075	
Depth of beam	in inches	4	3'495	3'509	3'524	3'537	3'551	3'565	3'578	3'591	3'605	3'618
Breadth of beam	in inches		2'472	2'481	2'491	2'501	2'511	2'521	2'530	2'539	2'549	2'558
Sectional area	in sup. feet		0'5000	0'5049	0'5097	0'5146	0'5194	0'5241	0'5288	0'5335	0'5381	0'5427
Contents	in cubic feet		1'900	1'814	1'829	1'843	1'858	1'872	1'886	1'900	1'915	1'928
Weight	in lbs.		8'100	8'166	8'231	8'296	8'361	8'425	8'488	8'552	8'615	8'677
Breaking-weight per sup. foot	in lbs.	5	88'02	87'65	87'31	86'97	86'63	86'30	85'98	85'65	85'35	85'04
Weight distributed	in lbs.		1830	1860	1890	1920	1950	1980	2010	2040	2070	2100
Breaking-weight distributed	...		1611'	1630'	1650'	1669'	1689'	1708'	1728'	1747'	1765'	1789'
Depth of beam	in inches		5'127	5'148	5'169	5'189	5'209	5'229	5'249	5'268	5'288	5'307
Breadth of beam	in inches		3'625	3'640	3'655	3'669	3'683	3'697	3'711	3'725	3'739	3'752
Sectional area	in sup. feet	6	1'231	1'301	1'312	1'322	1'332	1'343	1'353	1'363	1'373	1'383
Contents	in cubic feet		0'6455	0'6507	0'6559	0'6611	0'6663	0'6714	0'6765	0'6815	0'6865	0'6915
Weight	in lbs.		29'05	29'28	29'52	29'75	29'98	30'21	30'44	30'66	30'89	31'11
Breaking-weight per sup. foot	in lbs.		100'0	99'60	99'21	98'82	98'43	98'06	97'69	97'33	96'98	96'63
Weight distributed	in lbs.		3050	3100	3150	3200	3250	3300	3350	3400	3450	3500
Breaking-weight distributed	...	3050'	3087'	3125'	3162'	3199'	3236'	3272'	3309'	3345'	3382'	
Depth of beam	in inches	7	5'878	5'903	5'926	5'949	5'972	5'995	6'018	6'040	6'062	6'084
Breadth of beam	in inches		4'157	4'174	4'190	4'207	4'223	4'239	4'255	4'271	4'287	4'302
Sectional area	in sup. feet		1'697	1'711	1'724	1'738	1'752	1'765	1'779	1'791	1'805	1'818
Contents	in cubic feet		1'018	1'025	1'034	1'043	1'051	1'059	1'067	1'075	1'083	1'090
Weight	in lbs.		45'82	46'20	46'56	46'93	47'30	47'66	48'02	48'38	48'73	49'08
Breaking-weight per sup. foot	in lbs.	8	104'6	104'3	103'8	103'4	103'0	102'6	102'2	101'9	101'5	101'1
Weight distributed	in lbs.		3660	3720	3780	3840	3900	3960	4020	4080	4140	4200
Breaking-weight distributed	...		3831'	3878'	3925'	3971'	4018'	4065'	4110'	4156'	4202'	4247'
Depth of beam	in inches		6'599	6'627	6'653	6'679	6'705	6'730	6'756	6'781	6'805	6'830
Breadth of beam	in inches		4'666	4'685	4'704	4'722	4'740	4'757	4'774	4'795	4'812	4'829
Sectional area	in sup. feet	9	2'138	2'156	2'173	2'190	2'207	2'224	2'241	2'258	2'274	2'291
Contents	in cubic feet		1'497	1'509	1'521	1'533	1'546	1'557	1'569	1'580	1'593	1'604
Weight	in lbs.		67'33	67'91	68'46	69'00	69'54	70'07	70'60	71'13	71'65	72'16
Breaking-weight per sup. foot	in lbs.		108'8	108'3	107'9	107'5	107'0	106'7	106'3	105'8	105'5	105'1
Weight distributed	in lbs.		4270	4340	4410	4480	4550	4620	4690	4760	4830	4900
Breaking-weight distributed	...	4646'	4702'	4759'	4815'	4872'	4928'	4984'	5039'	5095'	5150'	
Depth of beam	in inches	10	7'295	7'324	7'353	7'382	7'411	7'439	7'467	7'495	7'522	7'550
Breadth of beam	in inches		5'158	5'179	5'199	5'220	5'240	5'261	5'280	5'300	5'319	5'338
Sectional area	in sup. feet		2'613	2'634	2'655	2'676	2'697	2'718	2'738	2'758	2'779	2'799
Contents	in cubic feet		2'090	2'107	2'124	2'141	2'158	2'174	2'190	2'207	2'224	2'239
Weight	in lbs.		94'07	94'84	95'59	96'35	97'10	97'84	98'59	99'32	100'0	100'7
Breaking-weight per sup. foot	in lbs.	11	112'5	112'0	111'5	111'1	110'7	110'3	109'8	109'4	109'0	108'7
Weight distributed	in lbs.		4880	4960	5040	5120	5200	5280	5360	5440	5520	5600
Breaking-weight distributed	...		5489'	5556'	5624'	5690'	5757'	5823'	5889'	5955'	6021'	6086'
Depth of beam	in inches		8'000	8'032	8'064	8'095	8'126	8'151	8'187	8'217	8'247	8'277
Breadth of beam	in inches		5'634	5'657	5'680	5'702	5'724	5'746	5'765	5'789	5'811	5'831
Sectional area	in sup. feet	12	3'117	3'143	3'168	3'193	3'218	3'243	3'267	3'291	3'316	3'339
Contents	in cubic feet		2'806	2'829	2'852	2'874	2'896	2'918	2'940	2'962	2'984	3'005
Weight	in lbs.		126'6	127'3	128'3	129'3	130'4	131'3	132'6	133'3	134'3	135'3
Breaking-weight per sup. foot	in lbs.		115'8	115'4	114'9	114'4	114'0	113'6	113'1	112'8	112'3	111'9
Weight distributed	in lbs.		5190	5280	5370	5460	5550	5640	5730	5820	5910	6000
Breaking-weight distributed	...	6360'	6438'	6515'	6593'	6670'	6746'	6824'	6899'	6975'	7051'	
Depth of beam	in inches	13	8'623	8'658	8'693	8'727	8'761	8'795	8'828	8'860	8'893	8'924
Breadth of beam	in inches		6'097	6'122	6'147	6'171	6'195	6'219	6'242	6'265	6'288	6'311
Sectional area	in sup. feet		3'551	3'582	3'611	3'640	3'669	3'698	3'727	3'755	3'783	3'811
Contents	in cubic feet		3'651	3'682	3'711	3'740	3'769	3'798	3'827	3'855	3'883	3'911
Weight	in lbs.		164'3	165'6	167'0	168'3	169'6	170'9	172'2	173'5	174'7	175'9
Breaking-weight per sup. foot	in lbs.	14	118'9	118'4	117'9	117'5	117'0	116'6	116'2	115'7	115'3	114'9
Weight distributed	in lbs.		6100	6200	6300	6400	6500	6600	6700	6800	6900	7000
Breaking-weight distributed	...		7255'	7344'	7432'	7521'	7609'	7698'	7784'	7871'	7957'	8044'

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		7'1	7'2	7'3	7'4	7'5	7'6	7'7	7'8	7'9	8'0
Depth of beam in inches	1	1'589	1'594	1'600	1'605	1'611	1'616	1'621	1'627	1'635	1'641
Breadth of beam in inches		1'126	1'130	1'134	1'138	1'141	1'146	1'149	1'153	1'157	1'160
Sectional area in sup. feet		0'1245	0'1254	0'1263	0'1271	0'1280	0'1289	0'1298	0'1305	0'1314	0'1322
Contents in cubic feet		0'1245	0'1254	0'1263	0'1271	0'1280	0'1289	0'1298	0'1305	0'1314	0'1322
Weight in lbs.		5606	5646	5684	5723	5761	5800	5838	5875	5913	5950
Breaking-weight per sup. foot in lbs.		64'39	64'16	63'94	63'73	63'51	63'30	63'10	62'89	62'69	62'50
Weight distributed in lbs.		710	720	730	740	750	760	770	780	790	800
Breaking-weight distributed		457'4	462'0	466'8	471'6	476'3	481'1	485'8	490'6	495'3	500'0
Depth of beam in inches	2	2'678	2'686	2'697	2'706	2'715	2'724	2'733	2'742	2'751	2'759
Breadth of beam in inches		1'894	1'900	1'907	1'914	1'920	1'927	1'933	1'939	1'946	1'950
Sectional area in sup. feet		0'3523	0'3549	0'3573	0'3597	0'3621	0'3645	0'3669	0'3684	0'3716	0'3740
Contents in cubic feet		0'3523	0'3549	0'3573	0'3597	0'3621	0'3645	0'3669	0'3684	0'3716	0'3740
Weight in lbs.		1371	1383	1393	1403	1413	1423	1433	1443	1453	1463
Breaking-weight per sup. foot in lbs.		76'57	76'31	76'04	75'78	75'53	75'28	75'04	74'79	74'56	74'32
Weight distributed in lbs.		1420	1440	1460	1480	1500	1520	1540	1560	1580	1600
Breaking-weight distributed		1087	1098	1110	1121	1133	1144	1155	1166	1178	1189
Depth of beam in inches	3	3'631	3'643	3'656	3'668	3'680	3'693	3'705	3'717	3'729	3'740
Breadth of beam in inches		2'567	2'577	2'585	2'594	2'602	2'611	2'620	2'628	2'637	2'645
Sectional area in sup. feet		0'6473	0'6518	0'6564	0'6609	0'6653	0'6697	0'6741	0'6785	0'6828	0'6871
Contents in cubic feet		0'6473	0'6518	0'6564	0'6609	0'6653	0'6697	0'6741	0'6785	0'6828	0'6871
Weight in lbs.		2343	2363	2383	2403	2423	2443	2463	2483	2503	2523
Breaking-weight per sup. foot in lbs.		84'74	84'45	84'15	83'87	83'59	83'31	83'04	82'77	82'51	82'25
Weight distributed in lbs.		2130	2160	2190	2220	2250	2280	2310	2340	2370	2400
Breaking-weight distributed		1805	1824	1843	1862	1880	1899	1918	1937	1955	1974
Depth of beam in inches	4	4'505	4'520	4'536	4'552	4'567	4'582	4'597	4'612	4'627	4'641
Breadth of beam in inches		3'185	3'196	3'207	3'218	3'229	3'240	3'251	3'261	3'271	3'282
Sectional area in sup. feet		0'9966	1'003	1'010	1'017	1'024	1'031	1'038	1'044	1'051	1'057
Contents in cubic feet		0'9966	1'003	1'010	1'017	1'024	1'031	1'038	1'044	1'051	1'057
Weight in lbs.		3386	3404	3422	3440	3458	3476	3494	3512	3530	3548
Breaking-weight per sup. foot in lbs.		91'06	90'74	90'43	90'12	89'82	89'52	89'23	88'94	88'66	88'38
Weight distributed in lbs.		2840	2880	2920	2960	3000	3040	3080	3120	3160	3200
Breaking-weight distributed		2586	2613	2640	2668	2694	2721	2748	2775	2801	2828
Depth of beam in inches	5	5'325	5'344	5'363	5'381	5'399	5'417	5'435	5'452	5'470	5'487
Breadth of beam in inches		3'766	3'779	3'792	3'805	3'818	3'830	3'843	3'855	3'867	3'880
Sectional area in sup. feet		1'392	1'402	1'412	1'422	1'431	1'441	1'450	1'459	1'469	1'478
Contents in cubic feet		1'392	1'402	1'412	1'422	1'431	1'441	1'450	1'459	1'469	1'478
Weight in lbs.		4944	4978	5012	5046	5080	5114	5148	5182	5216	5250
Breaking-weight per sup. foot in lbs.		96'29	95'95	95'62	95'29	94'98	94'66	94'35	94'05	93'75	93'45
Weight distributed in lbs.		3550	3600	3650	3700	3750	3800	3850	3900	3950	4000
Breaking-weight distributed		3418	3454	3490	3526	3561	3597	3632	3668	3703	3738
Depth of beam in inches	6	6'106	6'127	6'148	6'169	6'190	6'211	6'231	6'251	6'271	6'291
Breadth of beam in inches		4'317	4'333	4'348	4'363	4'377	4'391	4'406	4'420	4'434	4'448
Sectional area in sup. feet		1'881	1'893	1'905	1'917	1'929	1'941	1'953	1'965	1'977	1'989
Contents in cubic feet		1'881	1'893	1'905	1'917	1'929	1'941	1'953	1'965	1'977	1'989
Weight in lbs.		6644	6688	6732	6776	6820	6864	6908	6952	6996	7040
Breaking-weight per sup. foot in lbs.		100'7	100'4	100'1	99'78	99'46	99'14	98'82	98'50	98'18	97'86
Weight distributed in lbs.		4290	4320	4350	4380	4410	4440	4470	4500	4530	4560
Breaking-weight distributed		4292	4338	4383	4429	4473	4518	4562	4607	4651	4695
Depth of beam in inches	7	6'854	6'878	6'903	6'926	6'949	6'971	6'995	7'017	7'040	7'062
Breadth of beam in inches		4'847	4'864	4'880	4'897	4'913	4'930	4'946	4'962	4'978	4'993
Sectional area in sup. feet		2'507	2'523	2'539	2'555	2'571	2'587	2'603	2'619	2'635	2'650
Contents in cubic feet		2'507	2'523	2'539	2'555	2'571	2'587	2'603	2'619	2'635	2'650
Weight in lbs.		7268	7319	7370	7421	7472	7523	7574	7625	7676	7727
Breaking-weight per sup. foot in lbs.		104'8	104'3	103'8	103'3	102'8	102'3	101'8	101'3	100'8	100'3
Weight distributed in lbs.		4970	5040	5110	5180	5250	5320	5390	5460	5530	5600
Breaking-weight distributed		5205	5261	5315	5369	5424	5478	5532	5585	5639	5693
Depth of beam in inches	8	7'576	7'604	7'632	7'655	7'681	7'706	7'732	7'757	7'781	7'806
Breadth of beam in inches		5'357	5'376	5'395	5'413	5'431	5'449	5'467	5'485	5'502	5'519
Sectional area in sup. feet		3'281	3'303	3'325	3'347	3'369	3'391	3'413	3'435	3'457	3'479
Contents in cubic feet		3'281	3'303	3'325	3'347	3'369	3'391	3'413	3'435	3'457	3'479
Weight in lbs.		1014	1022	1030	1038	1046	1054	1062	1070	1078	1086
Breaking-weight per sup. foot in lbs.		108'2	107'9	107'5	107'2	106'8	106'5	106'1	105'7	105'4	105'1
Weight distributed in lbs.		5680	5760	5840	5920	6000	6080	6160	6240	6320	6400
Breaking-weight distributed		6151	6216	6281	6345	6409	6473	6537	6600	6664	6727
Depth of beam in inches	9	8'276	8'305	8'334	8'362	8'390	8'418	8'446	8'473	8'500	8'527
Breadth of beam in inches		5'852	5'872	5'893	5'913	5'933	5'952	5'972	5'991	6'010	6'029
Sectional area in sup. feet		3'927	3'947	3'967	3'987	4'007	4'027	4'047	4'067	4'087	4'107
Contents in cubic feet		3'927	3'947	3'967	3'987	4'007	4'027	4'047	4'067	4'087	4'107
Weight in lbs.		1362	1371	1381	1391	1401	1411	1421	1431	1441	1451
Breaking-weight per sup. foot in lbs.		111'5	111'1	110'7	110'3	109'9	109'5	109'1	108'7	108'3	107'9
Weight distributed in lbs.		6390	6480	6570	6660	6750	6840	6930	7020	7110	7200
Breaking-weight distributed		7126	7202	7277	7351	7425	7500	7574	7647	7720	7794
Depth of beam in inches	10	8'957	8'988	9'019	9'050	9'080	9'110	9'140	9'170	9'199	9'228
Breadth of beam in inches		6'333	6'355	6'377	6'399	6'421	6'442	6'463	6'484	6'504	6'525
Sectional area in sup. feet		4'303	4'325	4'347	4'369	4'391	4'413	4'435	4'457	4'479	4'501
Contents in cubic feet		4'303	4'325	4'347	4'369	4'391	4'413	4'435	4'457	4'479	4'501
Weight in lbs.		1772	1783	1793	1804	1814	1825	1835	1846	1856	1867
Breaking-weight per sup. foot in lbs.		114'5	114'1	113'7	113'3	112'9	112'5	112'1	111'7	111'3	110'9
Weight distributed in lbs.		7100	7200	7300	7400	7500	7600	7700	7800	7900	8000
Breaking-weight distributed		8129	8215	8301	8386	8471	8555	8640	8724	8807	8891

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre = S.									
			8'1	8'2	8'3	8'4	8'5	8'6	8'7	8'8	8'9	9'0
Depth of beam	in inches	1	1'646	1'651	1'656	1'661	1'666	1'671	1'675	1'680	1'685	1'690
Breadth of beam	in inches		1'164	1'167	1'171	1'174	1'178	1'181	1'185	1'188	1'192	1'195
Sectional area	in sup. feet		0'1331	0'1338	0'1347	0'1355	0'1363	0'1371	0'1379	0'1387	0'1394	0'1402
Contents	in cubic feet		0'1331	0'1338	0'1347	0'1355	0'1363	0'1371	0'1379	0'1387	0'1394	0'1402
Weight	in lbs.		6015	6024	6031	6039	6046	6053	6060	6067	6074	6081
Breaking-weight per sup. foot	in lbs.		62'30	62'11	61'92	61'74	61'56	61'38	61'20	61'02	60'85	60'68
Weight distributed	in lbs.		810	820	830	840	850	860	870	880	900	
Breaking-weight distributed	...		504'7	509'4	514'0	518'6	523'2	527'8	532'4	537'1	541'9	
Depth of beam	in inches	2	2'768	2'777	2'785	2'793	2'802	2'810	2'819	2'826	2'834	2'842
Breadth of beam	in inches		1'957	1'964	1'969	1'975	1'981	1'987	1'992	1'998	2'004	2'010
Sectional area	in sup. feet		0'3763	0'3786	0'3809	0'3832	0'3855	0'3878	0'3900	0'3922	0'3945	0'3967
Contents	in cubic feet		0'3763	0'3786	0'3809	0'3832	0'3855	0'3878	0'3900	0'3922	0'3945	0'3967
Weight	in lbs.		1387	1397	1407	1417	1427	1437	1447	1457	1467	1477
Breaking-weight per sup. foot	in lbs.		74'09	73'86	73'64	73'42	73'20	72'99	72'78	72'57	72'37	72'16
Weight distributed	in lbs.		1620	1640	1660	1680	1700	1720	1740	1760	1800	
Breaking-weight distributed	...		1200'	1211'	1222'	1234'	1244'	1255'	1266'	1277'	1288'	
Depth of beam	in inches	3	3'750	3'764	3'775	3'786	3'797	3'809	3'820	3'831	3'841	3'852
Breadth of beam	in inches		2'653	2'661	2'669	2'677	2'686	2'697	2'701	2'709	2'717	2'724
Sectional area	in sup. feet		0'6914	0'6956	0'6999	0'7041	0'7082	0'7124	0'7165	0'7207	0'7247	0'7288
Contents	in cubic feet		0'7074	0'7087	0'7099	0'7112	0'7124	0'7137	0'7149	0'7162	0'7174	0'7186
Weight	in lbs.		9'334	9'391	9'448	9'505	9'561	9'617	9'673	9'729	9'784	9'839
Breaking-weight per sup. foot	in lbs.		82'00	81'74	81'50	81'25	81'01	80'77	80'54	80'31	80'09	79'86
Weight distributed	in lbs.		2430	2460	2490	2520	2550	2580	2610	2640	2700	
Breaking-weight distributed	...		1992'	2011'	2029'	2047'	2066'	2084'	2103'	2120'	2156'	
Depth of beam	in inches	4	4'656	4'670	4'684	4'698	4'712	4'726	4'740	4'754	4'767	4'780
Breadth of beam	in inches		3'292	3'302	3'312	3'322	3'332	3'342	3'351	3'361	3'370	3'380
Sectional area	in sup. feet		1'065	1'071	1'077	1'084	1'090	1'097	1'103	1'110	1'115	1'123
Contents	in cubic feet		1'258	1'264	1'270	1'277	1'284	1'290	1'297	1'303	1'309	1'315
Weight	in lbs.		19'116	19'28	19'39	19'51	19'62	19'74	19'85	19'97	20'08	20'19
Breaking-weight per sup. foot	in lbs.		88'11	87'84	87'57	87'31	87'05	86'80	86'55	86'30	86'05	85'82
Weight distributed	in lbs.		3240	3280	3320	3360	3400	3440	3480	3520	3560	
Breaking-weight distributed	...		2854'	2881'	2907'	2933'	2959'	2986'	3012'	3038'	3064'	
Depth of beam	in inches	5	5'504	5'521	5'538	5'554	5'571	5'587	5'603	5'619	5'635	5'651
Breadth of beam	in inches		3'892	3'904	3'916	3'927	3'939	3'950	3'962	3'973	3'985	3'996
Sectional area	in sup. feet		1'487	1'497	1'506	1'515	1'524	1'532	1'541	1'550	1'559	1'568
Contents	in cubic feet		1'748	1'758	1'767	1'776	1'785	1'794	1'803	1'812	1'821	1'830
Weight	in lbs.		33'47	33'67	33'88	34'08	34'28	34'48	34'68	34'88	35'08	35'28
Breaking-weight per sup. foot	in lbs.		98'16	97'88	97'60	97'32	97'05	96'78	96'51	96'25	95'98	95'74
Weight distributed	in lbs.		4050	4100	4150	4200	4250	4300	4350	4400	4450	
Breaking-weight distributed	...		3773'	3808'	3843'	3877'	3912'	3946'	3982'	4015'	4054'	
Depth of beam	in inches	6	6'310	6'330	6'349	6'368	6'387	6'405	6'424	6'442	6'461	6'479
Breadth of beam	in inches		4'462	4'476	4'489	4'503	4'516	4'529	4'542	4'555	4'568	4'582
Sectional area	in sup. feet		1'955	1'962	1'970	1'979	1'987	1'995	2'003	2'011	2'019	2'027
Contents	in cubic feet		1'173	1'181	1'186	1'195	1'202	1'209	1'216	1'223	1'230	1'237
Weight	in lbs.		52'80	53'11	53'45	53'77	54'09	54'41	54'72	55'03	55'35	55'66
Breaking-weight per sup. foot	in lbs.		97'51	97'21	96'92	96'63	96'34	96'06	95'78	95'51	95'24	94'98
Weight distributed	in lbs.		4860	4920	4980	5040	5100	5160	5220	5280	5340	
Breaking-weight distributed	...		4739'	4783'	4827'	4870'	4913'	4957'	5001'	5043'	5086'	
Depth of beam	in inches	7	7'084	7'106	7'127	7'149	7'170	7'191	7'212	7'232	7'253	7'273
Breadth of beam	in inches		5'009	5'024	5'040	5'055	5'070	5'084	5'099	5'114	5'129	5'143
Sectional area	in sup. feet		2'464	2'479	2'495	2'509	2'524	2'539	2'554	2'568	2'583	2'597
Contents	in cubic feet		1'725	1'735	1'745	1'755	1'767	1'777	1'784	1'798	1'816	1'831
Weight	in lbs.		77'63	78'10	78'58	79'05	79'52	79'99	80'45	80'91	81'27	81'88
Breaking-weight per sup. foot	in lbs.		101'3	101'0	100'7	100'4	100'1	99'83	99'55	99'26	98'98	98'71
Weight distributed	in lbs.		5670	5740	5810	5880	5950	6020	6090	6160	6230	
Breaking-weight distributed	...		8746'	8799'	8852'	8905'	8957'	9010'	9062'	9115'	9167'	
Depth of beam	in inches	8	7'890	7'954	7'978	7'992	7'996	7'948	7'971	7'994	8'017	8'039
Breadth of beam	in inches		5'537	5'553	5'569	5'585	5'601	5'617	5'633	5'649	5'665	5'681
Sectional area	in sup. feet		3'011	3'023	3'038	3'053	3'068	3'083	3'098	3'113	3'128	3'143
Contents	in cubic feet		2'409	2'423	2'438	2'453	2'467	2'482	2'496	2'510	2'525	2'539
Weight	in lbs.		108'4	109'0	109'7	110'3	111'0	111'7	112'3	113'0	113'6	114'2
Breaking-weight per sup. foot	in lbs.		104'8	104'4	104'1	103'8	103'6	103'2	102'9	102'6	102'4	102'0
Weight distributed	in lbs.		6480	6560	6640	6720	6800	6880	6960	7040	7120	
Breaking-weight distributed	...		6790'	6853'	6915'	6978'	7040'	7102'	7164'	7226'	7287'	
Depth of beam	in inches	9	8'553	8'579	8'606	8'631	8'657	8'682	8'707	8'732	8'757	8'782
Breadth of beam	in inches		6'048	6'067	6'086	6'103	6'121	6'139	6'157	6'174	6'192	6'209
Sectional area	in sup. feet		3'592	3'615	3'636	3'658	3'680	3'702	3'723	3'744	3'765	3'787
Contents	in cubic feet		3'233	3'253	3'273	3'292	3'312	3'331	3'351	3'370	3'389	3'408
Weight	in lbs.		145'5	146'4	147'3	148'1	149'0	149'9	150'7	151'6	152'5	153'3
Breaking-weight per sup. foot	in lbs.		107'9	107'5	107'2	107'0	106'6	106'3	106'0	105'7	105'4	105'1
Weight distributed	in lbs.		7290	7380	7470	7560	7650	7740	7830	7920	8010	
Breaking-weight distributed	...		7867'	7939'	8012'	8084'	8156'	8228'	8300'	8372'	8443'	
Depth of beam	in inches	10	9'257	9'285	9'313	9'341	9'369	9'396	9'423	9'450	9'477	9'504
Breadth of beam	in inches		6'545	6'565	6'585	6'605	6'625	6'644	6'663	6'682	6'701	6'720
Sectional area	in sup. feet		4'208	4'233	4'258	4'283	4'307	4'331	4'355	4'379	4'403	4'427
Contents	in cubic feet		4'208	4'233	4'258	4'283	4'307	4'331	4'355	4'379	4'403	4'427
Weight	in lbs.		189'3	190'5	191'7	192'8	193'9	195'1	196'2	197'3	1'985	1'99'6
Breaking-weight per sup. foot	in lbs.		110'8	110'5	110'1	109'7	109'4	109'2	108'8	108'5	1'082	1'07'8
Weight distributed	in lbs.		8100	8200	8300	8400	8500	8600	8700	8800	8900	
Breaking-weight distributed	...		8975'	9058'	9140'	9223'	9305'	9387'	9469'	9550'	9632'	

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		9'1	9'2	9'3	9'4	9'5	9'6	9'7	9'8	9'9	10'0
Depth of beam in inches	1	1'695	1'699	1'704	1'708	1'713	1'717	1'722	1'726	1'730	1'735
Breadth of beam in inches		1'198	1'201	1'204	1'208	1'211	1'214	1'217	1'220	1'223	1'227
Sectional area in sup. feet		0'1410	0'1418	0'1426	0'1433	0'1441	0'1448	0'1456	0'1463	0'1471	0'1478
Contents in cubic feet		0'1410	0'1418	0'1426	0'1433	0'1441	0'1448	0'1456	0'1463	0'1471	0'1478
Weight in lbs.		6346	6375	6416	6450	6484	6518	6552	6586	6620	6653
Breaking-weight per sup. foot in lbs.		60'51	60'35	60'19	60'03	59'87	59'71	59'55	59'40	59'25	59'10
Weight distributed in lbs.		910	920	930	940	950	960	970	980	990	1000
Breaking-weight distributed		550'7	555'2	559'8	564'2	568'8	573'2	577'7	582'2	586'6	591'1
Depth of beam in inches	2	2'850	2'858	2'865	2'873	2'881	2'888	2'896	2'903	2'911	2'918
Breadth of beam in inches		2'015	2'020	2'026	2'031	2'038	2'042	2'047	2'053	2'058	2'063
Sectional area in sup. feet		0'3989	0'4010	0'4032	0'4054	0'4075	0'4097	0'4118	0'4139	0'4160	0'4181
Contents in cubic feet		0'3989	0'4010	0'4032	0'4054	0'4075	0'4097	0'4118	0'4139	0'4160	0'4181
Weight in lbs.		3'590	3'609	3'629	3'650	3'668	3'687	3'706	3'725	3'744	3'763
Breaking-weight per sup. foot in lbs.		71'97	71'77	71'58	71'38	71'20	71'01	70'83	70'65	70'47	70'29
Weight distributed in lbs.		1820	1820	1820	1820	1820	1820	1820	1820	1820	1820
Breaking-weight distributed		1310'	1320'	1331'	1342'	1353'	1363'	1377'	1384'	1395'	1405'
Depth of beam in inches	3	3'893	3'873	3'884	3'894	3'905	3'915	3'925	3'935	3'945	3'955
Breadth of beam in inches		2'731	2'739	2'746	2'754	2'761	2'768	2'775	2'782	2'789	2'796
Sectional area in sup. feet		0'7329	0'7338	0'7348	0'7358	0'7368	0'7377	0'7387	0'7396	0'7405	0'7414
Contents in cubic feet		0'7329	0'7338	0'7348	0'7358	0'7368	0'7377	0'7387	0'7396	0'7405	0'7414
Weight in lbs.		9'893	9'947	10'000	10'053	10'106	10'159	10'212	10'265	10'318	10'371
Breaking-weight per sup. foot in lbs.		79'64	79'43	79'21	79'00	78'79	78'58	78'38	78'18	77'99	77'79
Weight distributed in lbs.		2730	2760	2790	2820	2850	2880	2910	2940	2970	3000
Breaking-weight distributed		2174'	2192'	2210'	2227'	2245'	2263'	2281'	2298'	2316'	2334'
Depth of beam in inches	4	4'793	4'806	4'820	4'832	4'845	4'858	4'870	4'883	4'895	4'907
Breadth of beam in inches		3'389	3'398	3'408	3'417	3'426	3'435	3'444	3'452	3'461	3'470
Sectional area in sup. feet		1'128	1'134	1'141	1'146	1'152	1'159	1'165	1'171	1'177	1'182
Contents in cubic feet		1'128	1'134	1'141	1'146	1'152	1'159	1'165	1'171	1'177	1'182
Weight in lbs.		20'31	20'42	20'53	20'64	20'75	20'86	20'96	21'07	21'19	21'29
Breaking-weight per sup. foot in lbs.		85'58	85'35	85'12	84'89	84'67	84'44	84'21	83'98	83'75	83'52
Weight distributed in lbs.		3640	3680	3720	3760	3800	3840	3880	3920	3960	4000
Breaking-weight distributed		3115'	3141'	3168'	3192'	3217'	3243'	3268'	3293'	3318'	3343'
Depth of beam in inches	5	5'666	5'682	5'697	5'713	5'728	5'743	5'758	5'772	5'787	5'802
Breadth of beam in inches		4'007	4'018	4'029	4'039	4'050	4'061	4'071	4'082	4'092	4'103
Sectional area in sup. feet		1'576	1'585	1'594	1'602	1'611	1'619	1'628	1'636	1'645	1'653
Contents in cubic feet		1'576	1'585	1'594	1'602	1'611	1'619	1'628	1'636	1'645	1'653
Weight in lbs.		35'47	35'67	35'86	36'05	36'24	36'44	36'62	36'82	37'00	37'19
Breaking-weight per sup. foot in lbs.		90'49	90'25	90'00	89'75	89'50	89'25	89'00	88'75	88'50	88'25
Weight distributed in lbs.		4550	4600	4650	4700	4750	4800	4850	4900	4950	5000
Breaking-weight distributed		4117'	4151'	4185'	4219'	4252'	4286'	4319'	4352'	4386'	4419'
Depth of beam in inches	6	6'497	6'514	6'532	6'550	6'567	6'584	6'601	6'618	6'635	6'652
Breadth of beam in inches		4'594	4'606	4'619	4'631	4'643	4'656	4'668	4'680	4'692	4'703
Sectional area in sup. feet		2'073	2'084	2'095	2'106	2'118	2'129	2'140	2'151	2'162	2'173
Contents in cubic feet		2'073	2'084	2'095	2'106	2'118	2'129	2'140	2'151	2'162	2'173
Weight in lbs.		55'97	56'27	56'56	56'85	57'14	57'43	57'72	58'01	58'30	58'59
Breaking-weight per sup. foot in lbs.		94'71	94'46	94'20	93'95	93'70	93'45	93'20	92'95	92'70	92'45
Weight distributed in lbs.		5400	5520	5580	5640	5700	5760	5820	5880	5940	6000
Breaking-weight distributed		5171'	5214'	5256'	5299'	5341'	5383'	5425'	5467'	5509'	5550'
Depth of beam in inches	7	7'293	7'313	7'333	7'352	7'372	7'391	7'410	7'429	7'448	7'466
Breadth of beam in inches		5'157	5'171	5'185	5'199	5'213	5'226	5'240	5'253	5'267	5'280
Sectional area in sup. feet		2'613	2'626	2'639	2'652	2'665	2'678	2'691	2'704	2'717	2'730
Contents in cubic feet		2'613	2'626	2'639	2'652	2'665	2'678	2'691	2'704	2'717	2'730
Weight in lbs.		82'28	82'72	83'16	83'60	84'04	84'48	84'92	85'36	85'80	86'24
Breaking-weight per sup. foot in lbs.		98'43	98'17	97'91	97'64	97'38	97'12	96'86	96'60	96'34	96'08
Weight distributed in lbs.		6370	6440	6510	6580	6650	6720	6790	6860	6930	7000
Breaking-weight distributed		6270'	6322'	6373'	6425'	6476'	6527'	6578'	6628'	6679'	6730'
Depth of beam in inches	8	8'061	8'083	8'105	8'127	8'149	8'170	8'191	8'212	8'233	8'254
Breadth of beam in inches		5'700	5'716	5'731	5'747	5'762	5'777	5'792	5'807	5'822	5'836
Sectional area in sup. feet		3'192	3'209	3'226	3'244	3'261	3'278	3'295	3'312	3'328	3'345
Contents in cubic feet		3'192	3'209	3'226	3'244	3'261	3'278	3'295	3'312	3'328	3'345
Weight in lbs.		114'9	115'5	116'2	116'7	117'4	118'0	118'6	119'2	119'8	120'4
Breaking-weight per sup. foot in lbs.		101'7	101'5	101'2	101'0	100'6	100'4	100'1	99'9	99'6	99'4
Weight distributed in lbs.		7280	7360	7440	7520	7600	7680	7760	7840	7920	8000
Breaking-weight distributed		7410'	7470'	7531'	7592'	7652'	7713'	7773'	7833'	7893'	7953'
Depth of beam in inches	9	8'896	8'890	8'884	8'877	8'870	8'863	8'856	8'849	8'842	8'835
Breadth of beam in inches		6'227	6'244	6'261	6'277	6'294	6'311	6'327	6'343	6'359	6'375
Sectional area in sup. feet		3'427	3'446	3'464	3'483	3'501	3'519	3'537	3'555	3'572	3'589
Contents in cubic feet		3'427	3'446	3'464	3'483	3'501	3'519	3'537	3'555	3'572	3'589
Weight in lbs.		104'8	104'5	104'3	104'0	103'7	103'4	103'1	102'8	102'5	102'2
Breaking-weight per sup. foot in lbs.		8190	8280	8370	8460	8550	8640	8730	8820	8910	9000
Weight distributed in lbs.		8585'	8695'	8795'	8895'	8995'	9095'	9195'	9295'	9395'	9495'
Breaking-weight distributed		8585'	8695'	8795'	8895'	8995'	9095'	9195'	9295'	9395'	9495'
Depth of beam in inches	10	9'530	9'556	9'582	9'608	9'633	9'658	9'683	9'708	9'733	9'757
Breadth of beam in inches		6'739	6'767	6'795	6'823	6'851	6'879	6'907	6'935	6'963	6'990
Sectional area in sup. feet		4'460	4'484	4'509	4'533	4'557	4'581	4'604	4'628	4'652	4'675
Contents in cubic feet		4'460	4'484	4'509	4'533	4'557	4'581	4'604	4'628	4'652	4'675
Weight in lbs.		200'7	201'8	202'9	203'9	205'0	206'1	207'2	208'2	209'3	210'4
Breaking-weight per sup. foot in lbs.		107'6	107'3	107'0	106'7	106'5	106'2	105'9	105'6	105'3	105'1
Weight distributed in lbs.		9100	9200	9300	9400	9500	9600	9700	9800	9900	10000
Breaking-weight distributed		9733'	9873'	9954'	10030'	10110'	10190'	10270'	10350'	10430'	10510'

Table No. V.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		11	12	13	14	15	16	17	18	19	20
Depth of beam in inches	1	1'777	1'816	1'853	1'887	1'920	1'951	1'981	2'010	2'037	2'062
Breadth of beam in inches		1'257	1'284	1'310	1'335	1'358	1'380	1'401	1'421	1'441	1'459
Sectional area in sup. feet		0'1551	0'1620	0'1686	0'1749	0'1811	0'1870	0'1930	0'1984	0'2038	0'2091
Contents in cubic feet		0'1551	0'1620	0'1686	0'1749	0'1811	0'1870	0'1930	0'1984	0'2038	0'2091
Weight in lbs.		6978	7288	7586	7872	8149	8416	8675	8925	9171	9409
Breaking-weight per sup. foot in lbs.		57'71	56'47	55'45	54'34	53'41	52'55	51'77	51'03	50'34	49'70
Weight distributed in lbs.		1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Breaking-weight distributed		634'9	677'7	719'6	760'7	801'1	840'9	880'0	918'5	956'5	994'1
Depth of beam in inches	2	2'988	3'054	3'116	3'174	3'229	3'282	3'322	3'380	3'426	3'470
Breadth of beam in inches		2'113	2'160	2'203	2'245	2'284	2'321	2'356	2'390	2'423	2'454
Sectional area in sup. feet		0'4386	0'4581	0'4768	0'4948	0'5122	0'5290	0'5452	0'5610	0'5764	0'5914
Contents in cubic feet		0'4386	0'4581	0'4768	0'4948	0'5122	0'5290	0'5452	0'5610	0'5764	0'5914

Table No. VIII.—Burma Teak.

Deflection Formulæ.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		21	22	23	24	25	26	27	28	29	30
Depth of beam in inches	1	2.088	2.113	2.137	2.160	2.182	2.207	2.225	2.245	2.264	2.284
Breadth of beam in inches		1.477	1.498	1.511	1.527	1.543	1.558	1.573	1.585	1.600	1.614
Sectional area in sup. feet		0.2142	0.2193	0.2242	0.2290	0.2338	0.2384	0.2429	0.2474	0.2518	0.2560
Contents in cubic feet		0.2142	0.2193	0.2242	0.2290	0.2338	0.2384	0.2429	0.2474	0.2518	0.2560
Weight in lbs.		9641	9869	10099	10330	10562	10795	11029	11263	11497	11731
Breaking-weight per sup. foot in lbs.		49.10	48.53	48.00	47.49	47.01	46.55	46.11	45.69	45.28	44.91
Weight distributed in lbs.	2	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
Breaking-weight distributed		1031	1067	1104	1139	1175	1210	1245	1280	1313	1347
Depth of beam in inches		3.513	3.554	3.594	3.632	3.670	3.705	3.741	3.775	3.808	3.841
Breadth of beam in inches		2.484	2.513	2.541	2.568	2.595	2.620	2.645	2.667	2.692	2.710
Sectional area in sup. feet		0.0600	0.0620	0.0642	0.0664	0.0686	0.0707	0.0728	0.0748	0.0768	0.0787
Contents in cubic feet		0.0600	0.0620	0.0642	0.0664	0.0686	0.0707	0.0728	0.0748	0.0768	0.0787
Weight in lbs.	3	1211	1240	1268	1295	1322	1348	1375	1402	1428	1454
Breadth of beam in inches		5.454	5.582	5.708	5.830	5.950	6.068	6.184	6.298	6.409	6.519
Sectional area in sup. feet		58.39	57.72	57.08	56.48	55.90	55.36	54.84	54.34	53.86	53.41
Contents in cubic feet		4200	4400	4600	4800	5000	5200	5400	5600	5800	6000
Weight in lbs.		2452	2539	2625	2711	2795	2878	2961	3043	3124	3204
Breaking-weight distributed		1031	1067	1104	1139	1175	1210	1245	1280	1313	1347
Depth of beam in inches	4	4.761	4.817	4.871	4.923	4.973	5.023	5.070	5.116	5.161	5.205
Breadth of beam in inches		3.367	3.406	3.445	3.481	3.517	3.552	3.586	3.614	3.650	3.673
Sectional area in sup. feet		1.113	1.139	1.165	1.190	1.215	1.239	1.262	1.286	1.307	1.331
Contents in cubic feet		3340	3418	3495	3570	3644	3716	3787	3856	3925	3992
Weight in lbs.		15.03	15.38	15.73	16.06	16.40	16.72	17.04	17.36	17.66	17.96
Breaking-weight per sup. foot in lbs.		64.62	63.88	63.17	62.50	61.87	61.26	60.68	60.13	59.61	59.10
Weight distributed in lbs.	5	6300	6600	6900	7200	7500	7800	8100	8400	8700	9000
Breaking-weight distributed		4071	4215	4358	4500	4640	4778	4915	5051	5186	5319
Depth of beam in inches		5.908	5.977	6.044	6.109	6.171	6.232	6.291	6.348	6.404	6.459
Breadth of beam in inches		4.178	4.227	4.274	4.320	4.364	4.407	4.449	4.488	4.529	4.560
Sectional area in sup. feet		1.714	1.754	1.794	1.833	1.870	1.907	1.944	1.979	2.014	2.048
Contents in cubic feet		9035	9158	9280	9401	9521	9640	9758	9875	9991	10107
Weight in lbs.	6	30.45	31.58	32.70	33.80	34.89	35.98	37.06	38.13	39.19	40.25
Breadth of beam in inches		69.44	68.64	67.83	67.01	66.18	65.34	64.49	63.64	62.79	61.94
Sectional area in sup. feet		8400	8800	9200	9600	10000	10400	10800	11200	11600	12000
Contents in cubic feet		5833	6040	6247	6447	6647	6846	7043	7237	7431	7621
Weight in lbs.		10500	11000	11500	12000	12500	13000	13500	14000	14500	15000
Breaking-weight distributed		7710	7983	8253	8521	8786	9048	9308	9566	9821	10070
Depth of beam in inches	7	6.084	6.166	6.247	6.327	6.406	6.484	6.561	6.637	6.712	6.786
Breadth of beam in inches		4.939	4.996	5.053	5.107	5.159	5.210	5.259	5.307	5.354	5.399
Sectional area in sup. feet		2.305	2.352	2.398	2.443	2.487	2.530	2.572	2.613	2.654	2.694
Contents in cubic feet		1.197	1.225	1.254	1.281	1.309	1.336	1.363	1.389	1.414	1.438
Weight in lbs.		53.89	55.16	56.40	57.62	58.83	59.97	61.11	62.28	63.43	64.42
Breaking-weight per sup. foot in lbs.		73.42	72.58	71.77	71.01	70.23	69.46	68.68	67.90	67.11	66.31
Weight distributed in lbs.	8	10500	11000	11500	12000	12500	13000	13500	14000	14500	15000
Breaking-weight distributed		7710	7983	8253	8521	8786	9048	9308	9566	9821	10070
Depth of beam in inches		8.008	8.102	8.191	8.280	8.364	8.447	8.527	8.605	8.681	8.755
Breadth of beam in inches		6.063	6.128	6.193	6.258	6.323	6.387	6.450	6.513	6.575	6.637
Sectional area in sup. feet		3.149	3.223	3.296	3.368	3.439	3.509	3.578	3.646	3.713	3.779
Contents in cubic feet		1.889	1.934	1.977	2.019	2.061	2.102	2.142	2.181	2.220	2.258
Weight in lbs.	9	85.02	87.03	89.08	91.17	93.29	95.41	97.54	99.68	101.82	103.95
Breadth of beam in inches		76.85	75.96	75.12	74.33	73.57	72.85	72.12	71.46	70.84	70.24
Sectional area in sup. feet		12600	13200	13800	14400	15000	15600	16200	16800	17400	18000
Contents in cubic feet		9683	10030	10380	10730	11080	11430	11780	12130	12480	12830
Weight in lbs.		12600	13200	13800	14400	15000	15600	16200	16800	17400	18000
Breaking-weight distributed		9683	10030	10380	10730	11080	11430	11780	12130	12480	12830
Depth of beam in inches	10	8.089	8.194	8.298	8.401	8.503	8.604	8.704	8.803	8.901	9.000
Breadth of beam in inches		6.357	6.431	6.503	6.574	6.644	6.713	6.781	6.848	6.914	6.979
Sectional area in sup. feet		3.968	4.061	4.153	4.244	4.334	4.423	4.511	4.598	4.684	4.769
Contents in cubic feet		2.777	2.843	2.907	2.970	3.032	3.093	3.153	3.212	3.270	3.327
Weight in lbs.		125.0	127.9	130.8	133.6	136.4	139.1	141.7	144.3	146.9	149.4
Breaking-weight per sup. foot in lbs.		79.96	78.94	77.94	76.97	76.00	75.03	74.06	73.09	72.12	71.15
Weight distributed in lbs.	11	14700	15400	16100	16800	17500	18200	18900	19600	20300	21000
Breaking-weight distributed		11740	12150	12570	12990	13410	13830	14250	14670	15090	15510
Depth of beam in inches		9.936	10.05	10.17	10.27	10.38	10.48	10.58	10.68	10.77	10.86
Breadth of beam in inches		7.036	7.108	7.178	7.245	7.311	7.376	7.440	7.503	7.565	7.627
Sectional area in sup. feet		4.848	4.962	5.074	5.184	5.292	5.399	5.505	5.610	5.714	5.817
Contents in cubic feet		3.878	3.970	4.059	4.146	4.232	4.316	4.398	4.478	4.558	4.636
Weight in lbs.	12	174.5	178.7	182.7	186.6	190.4	194.2	197.9	201.5	205.1	208.6
Breadth of beam in inches		82.56	81.62	80.72	79.87	79.07	78.29	77.49	76.70	75.92	75.15
Sectional area in sup. feet		16800	17600	18400	19200	20000	20800	21600	22400	23200	24000
Contents in cubic feet		13870	14360	14850	15330	15800	16280	16750	17210	17670	18120
Weight in lbs.		16800	17600	18400	19200	20000	20800	21600	22400	23200	24000
Breaking-weight distributed		13870	14360	14850	15330	15800	16280	16750	17210	17670	18120
Depth of beam in inches	13	10.85	10.98	11.10	11.22	11.34	11.45	11.56	11.66	11.77	11.87
Breadth of beam in inches		7.675	7.770	7.862	7.953	8.041	8.128	8.213	8.297	8.380	8.462
Sectional area in sup. feet		5.785	5.921	6.054	6.184	6.312	6.439	6.564	6.688	6.811	6.933
Contents in cubic feet		5.206	5.329	5.448	5.565	5.680	5.793	5.903	6.012	6.118	6.222
Weight in lbs.		234.3	239.8	245.2	250.4	255.6	260.7	265.7	270.5	275.3	280.0
Breaking-weight per sup. foot in lbs.		84.85	83.87	82.94	82.07	81.23	80.44	79.63	78.81	77.99	77.16
Weight distributed in lbs.	14	18900	19800	20700	21600	22500	23400	24300	25200	26100	27000
Breaking-weight distributed		16970	17640	18310	18980	19650	20320	20990	21660	22330	23000
Depth of beam in inches		11.74	11.88	12.02	12.15	12.27	12.39	12.51	12.62	12.73	12.84
Breadth of beam in inches		8.306	8.404	8.497	8.588	8.676	8.762	8.845	8.927	9.008	9.088
Sectional area in sup. feet		6.776	6.935	7.091	7.243	7.393	7.539	7.683	7.824	7.962	8.098
Contents in cubic feet		6.075	6.235	6.390	6.541	6.688	6.832	6.973	7.111	7.247	7.381
Weight in lbs.	15	304.9	312.1	319.1	325.9	332.7	339.3	345.7	352.1	358.3	364.4
Breadth of beam in inches		87.33	86.31	85.35	84.45	83.59	82.78	82.00	81.26	80.54	79.86
Sectional area in sup. feet		21000	22000	23000	24000	25000	26000	27000	28000	29000	30000
Contents in cubic feet		16390	16980	17570	18160	18750	19340	19930	20520	21110	21700
Weight in lbs.		21000	22000	23000	24000	25000	26000	27000	28000	29000	30000
Breaking-weight distributed		16390	16980	17570	18160	18750	19340	19930	20520	21110	21700

Table No. VIII.—Burma Teak.

Deflection Formulæ.

$$\frac{P_b}{E_d} = \frac{800}{3900} \quad \frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.										
			1	2	3	4	5	6	7	8	9	10	
Depth of beam in inches	11	3.314	3.341	3.362	3.387	3.406	3.427	3.451	3.474	3.500	3.524	3.548	3.581
Breadth of beam in inches		2.343	2.377	2.394	2.414	2.434	2.454	2.477	2.500	2.524	2.548	2.572	2.605
Sectional area in sup. feet		.05393	.07628	.08342	.09042	.09742	.10442	.11142	.11842	.12542	.13242	.13942	.14642
Contents in cubic feet		.5933	.8390	.9224	1.0058	1.0892	1.1726	1.2560	1.3394	1.4228	1.5062	1.5896	1.6730
Weight in lbs.		26.69	37.76	46.24	53.39	59.70	65.40	70.64	75.51	80.09	84.43	88.56	92.50
Breaking-weight per sup. foot in lbs.		340.5	286.2	258.6	240.7	227.6	217.5	209.2	202.4	196.9	191.5	186.1	180.7
Weight distributed in lbs.	110	220	330	440	550	660	770	880	990	1100	1210	1320	
Breaking-weight distributed	...	374.4	629.7	853.5	1059	1252	1436	1611	1781	1946	2105	2259	
Depth of beam in inches	12	3.537	4.207	4.656	5.003	5.290	5.537	5.755	5.950	6.127	6.291	6.448	
Breadth of beam in inches		2.301	2.975	3.292	3.537	3.740	3.915	4.069	4.207	4.333	4.448	4.555	
Sectional area in sup. feet		.06146	.08092	.1065	.1229	.1375	.1505	.1626	.1738	.1843	.1943	.2039	.2132
Contents in cubic feet		.7375	1.043	1.277	1.475	1.649	1.806	1.951	2.086	2.212	2.332	2.448	2.561
Weight in lbs.		33.18	46.93	57.48	66.38	74.21	81.29	87.81	93.87	99.56	104.9	109.6	114.0
Breaking-weight per sup. foot in lbs.		347.8	292.5	264.3	245.9	228.2	213.8	202.8	193.8	186.0	179.2	173.4	167.6
Weight distributed in lbs.	120	240	360	480	600	720	840	960	1080	1200	1320	1440	
Breaking-weight distributed	...	417.4	702.1	951.6	1181	1395	1600	1796	1985	2169	2347	2519	
Depth of beam in inches	13	3.757	4.467	4.944	5.330	5.617	5.879	6.111	6.318	6.507	6.680	6.838	
Breadth of beam in inches		2.656	3.159	3.496	3.756	3.972	4.157	4.320	4.467	4.601	4.723	4.835	
Sectional area in sup. feet		.06330	.08090	.1060	.1286	.1487	.1665	.1822	.1960	.2080	.2192	.2297	.2395
Contents in cubic feet		.9009	1.274	1.560	1.801	2.014	2.206	2.383	2.548	2.702	2.846	2.980	3.104
Weight in lbs.		40.63	57.33	69.66	79.08	86.95	93.60	99.17	103.8	107.6	111.4	115.2	118.9
Breaking-weight per sup. foot in lbs.		354.9	298.4	269.6	250.9	237.3	226.7	218.2	211.0	204.9	199.6	194.3	189.0
Weight distributed in lbs.	130	260	390	520	650	780	910	1040	1170	1300	1430	1560	
Breaking-weight distributed	...	461.4	776.0	1051	1305	1542	1769	1985	2194	2397	2595	2789	
Depth of beam in inches	14	3.971	4.723	5.227	5.616	5.939	6.216	6.460	6.679	6.879	7.062	7.230	
Breadth of beam in inches		2.805	3.339	3.695	3.971	4.199	4.395	4.567	4.723	4.864	4.993	5.112	
Sectional area in sup. feet		.07745	.1095	.1341	.1549	.1731	.1897	.2049	.2190	.2323	.2450	.2572	.2689
Contents in cubic feet		1.084	1.533	1.878	2.168	2.424	2.656	2.868	3.066	3.252	3.428	3.594	3.751
Weight in lbs.		48.79	69.00	84.51	97.58	109.1	119.5	129.0	138.0	146.3	154.2	161.7	169.0
Breaking-weight per sup. foot in lbs.		361.5	304.0	274.7	255.6	241.7	231.0	222.2	214.9	208.7	203.3	197.8	192.3
Weight distributed in lbs.	140	280	420	560	700	840	980	1120	1260	1400	1540	1680	
Breaking-weight distributed	...	506.1	851.3	1154	1431	1692	1940	2178	2407	2630	2846	3054	
Depth of beam in inches	15	4.183	4.974	5.502	5.915	6.240	6.546	6.803	7.034	7.244	7.437	7.614	
Breadth of beam in inches		2.957	3.517	3.892	4.182	4.422	4.628	4.810	4.973	5.129	5.279	5.425	
Sectional area in sup. feet		.08589	.1214	.1481	.1717	.1920	.2104	.2272	.2429	.2577	.2716	.2846	.2967
Contents in cubic feet		1.233	1.822	2.311	2.777	3.208	3.595	3.948	4.268	4.554	4.807	5.037	5.244
Weight in lbs.		57.97	81.90	100.4	115.9	129.6	142.0	153.3	163.9	173.9	183.3	192.3	199.9
Breaking-weight per sup. foot in lbs.		367.8	309.3	279.5	260.1	246.0	235.0	226.1	218.7	212.4	206.8	201.4	196.0
Weight distributed in lbs.	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	
Breaking-weight distributed	...	551.7	928.0	1257	1560	1845	2115	2374	2625	2867	3102	3332	
Depth of beam in inches	16	4.390	5.220	5.777	6.208	6.564	6.870	7.140	7.383	7.603	7.806	7.994	
Breadth of beam in inches		3.104	3.691	4.085	4.389	4.641	4.858	5.049	5.220	5.376	5.519	5.651	
Sectional area in sup. feet		.09463	.1338	.1639	.1893	.2115	.2318	.2503	.2676	.2838	.2990	.3132	.3265
Contents in cubic feet		1.514	2.141	2.622	3.058	3.453	3.708	3.948	4.164	4.357	4.528	4.677	4.814
Weight in lbs.		68.13	96.35	118.0	136.2	152.3	166.8	179.7	191.2	201.3	210.4	218.4	225.4
Breaking-weight per sup. foot in lbs.		373.8	314.3	284.0	264.3	249.0	238.8	229.8	222.2	215.8	209.4	203.0	196.6
Weight distributed in lbs.	160	320	480	640	800	960	1120	1280	1440	1600	1760	1920	
Breaking-weight distributed	...	598.1	1006	1363	1691	2000	2293	2574	2852	3120	3378	3626	
Depth of beam in inches	17	4.594	5.463	6.046	6.497	6.870	7.190	7.473	7.726	7.957	8.169	8.364	
Breadth of beam in inches		3.248	3.863	4.275	4.594	4.857	5.084	5.284	5.463	5.626	5.775	5.912	
Sectional area in sup. feet		.1036	.1493	.1795	.2072	.2317	.2538	.2742	.2931	.3108	.3272	.3426	.3570
Contents in cubic feet		1.761	2.491	3.051	3.523	3.939	4.316	4.661	4.982	5.285	5.575	5.851	6.114
Weight in lbs.		79.27	112.1	137.3	158.5	177.2	194.1	209.7	224.6	238.8	251.4	262.7	272.9
Breaking-weight per sup. foot in lbs.		379.5	319.2	288.3	268.3	253.8	242.5	233.3	225.6	219.1	213.4	207.4	201.4
Weight distributed in lbs.	170	340	510	680	850	1020	1190	1360	1530	1700	1870	2040	
Breaking-weight distributed	...	645.2	1085	1467	1825	2157	2473	2776	3070	3352	3628	3898	
Depth of beam in inches	18	4.795	5.702	6.311	6.781	7.170	7.505	7.800	8.064	8.305	8.527	8.731	
Breadth of beam in inches		3.390	4.032	4.462	4.795	5.070	5.306	5.515	5.702	5.872	6.029	6.174	
Sectional area in sup. feet		.1129	.1696	.1955	.2258	.2524	.2765	.2987	.3193	.3387	.3569	.3740	.3900
Contents in cubic feet		2.032	2.874	3.520	4.065	4.544	4.978	5.377	5.748	6.096	6.424	6.732	7.020
Weight in lbs.		91.22	129.3	158.4	182.9	204.4	223.4	240.9	256.9	271.4	284.4	296.0	306.2
Breaking-weight per sup. foot in lbs.		385.0	323.7	292.5	272.2	257.4	246.0	236.9	229.0	222.2	216.5	210.9	205.2
Weight distributed in lbs.	180	360	540	720	900	1080	1260	1440	1620	1800	1980	2160	
Breaking-weight distributed	...	693.0	1165	1579	1960	2317	2656	2982	3297	3600	3897	4189	
Depth of beam in inches	19	4.994	5.938	6.572	7.062	7.467	7.815	8.123	8.398	8.649	8.880	9.094	
Breadth of beam in inches		3.531	4.199	4.647	4.993	5.280	5.526	5.743	5.938	6.115	6.279	6.430	
Sectional area in sup. feet		.1224	.1731	.2120	.2450	.2738	.3000	.3239	.3463	.3673	.3872	.4060	.4237
Contents in cubic feet		2.326	3.290	4.029	4.653	5.202	5.699	6.155	6.580	6.980	7.357	7.712	8.046
Weight in lbs.		104.7	149.4	181.3	209.4	234.1	256.5	277.0	2961	3141	331.0	346.9	361.7
Breaking-weight per sup. foot in lbs.		399.2	328.1	296.5	275.9	260.9	249.3	239.9	232.0	225.3	219.4	213.6	207.8
Weight distributed in lbs.	190	380	570	760	950	1140	1330	1520	1710	1900	2090	2280	
Breaking-weight distributed	...	741.5	1247	1690	2097	2479	2842	3191	3527	3853	4169	4476	
Depth of beam in inches	20	5.189	6.171	6.830	7.339	7.760	8.122	8.441	8.727	8.988	9.228	9.458	
Breadth of beam in inches		3.660	4.363	4.829	5.169	5.487	5.743	5.968	6.168	6.346	6.504	6.651	
Sectional area in sup. feet		.1322	.1870	.2230	.2544	.2836	.3109	.3369	.3617	.3854	.4080	.4295	.4500
Contents in cubic feet		2.644	3.740	4.580	5.280	5.913	6.478	6.977	7.410	7.780	8.094	8.352	8.594
Weight in lbs.		119.0	168.3	201.6	230.5	256.1	279.5	301.5	321.8	340.4	357.0	372.6	387.2
Breaking-weight per sup. foot in lbs.		395.2	332.3	300.3	279.5	264.3	252.5	243.0	234.7	227.4	221.0	214.6	208.2
Weight distributed in lbs.	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	
Breaking-weight distributed	...	790.5	1329	1802	2236	2643	3030	3402	3760	4108	4445	4769	

Table No. VIII.—Burma Teak.

Deflection Formulæ.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulæ.

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		1'1	1'2	1'3	1'4	1'5	1'6	1'7	1'8	1'9	2'0
Depth of beam in inches	11	6'036	6'169	6'293	6'411	6'523	6'629	6'730	6'827	6'919	7'009
Breadth of beam in inches		4'268	4'361	4'450	4'533	4'612	4'687	4'758	4'827	4'893	4'956
Sectional area in sup. feet		1'788	1'868	1'944	2'018	2'089	2'157	2'224	2'288	2'351	2'412
Contents in cubic feet		1'067	2'055	2'139	2'220	2'297	2'373	2'446	2'517	2'586	2'653
Weight in lbs.		88'35	92'48	96'26	99'89	103'4	106'7	110'0	113'3	116'4	119'4
Breaking-weight per sup. foot in lbs.	12	186'9	182'9	179'2	175'9	172'9	169'2	165'2	161'6	158'0	154'4
Weight distributed in lbs.		1210	1320	1430	1540	1650	1760	1870	1980	2090	2200
Breaking-weight distributed in lbs.		2261	2414	2563	2710	2854	2995	3134	3272	3407	3541
Depth of beam in inches		6'443	6'584	6'718	6'843	6'962	7'075	7'183	7'287	7'386	7'481
Breadth of beam in inches		4'555	4'656	4'750	4'839	4'923	5'003	5'079	5'153	5'222	5'290
Sectional area in sup. feet	13	2'038	2'129	2'216	2'298	2'375	2'448	2'517	2'582	2'643	2'700
Contents in cubic feet		2'446	2'554	2'659	2'759	2'856	2'950	3'041	3'129	3'214	3'298
Weight in lbs.		110'0	114'9	119'6	124'2	128'6	132'8	136'8	140'8	144'6	148'4
Breaking-weight per sup. foot in lbs.		191'0	186'9	182'9	178'9	174'7	170'5	166'3	162'0	157'7	153'4
Weight distributed in lbs.		1320	1440	1560	1680	1800	1920	2040	2160	2280	2400
Breaking-weight distributed in lbs.		2521	2691	2858	3021	3181	3339	3495	3648	3799	3948
Depth of beam in inches	14	6'841	6'992	7'133	7'266	7'393	7'512	7'623	7'728	7'828	7'924
Breadth of beam in inches		4'837	4'944	5'044	5'138	5'227	5'312	5'393	5'471	5'546	5'617
Sectional area in sup. feet		2'283	2'382	2'478	2'569	2'656	2'739	2'818	2'893	2'964	3'031
Contents in cubic feet		2'688	2'800	2'908	3'012	3'112	3'209	3'303	3'393	3'479	3'562
Weight in lbs.		134'4	140'4	146'1	151'6	157'0	162'1	167'2	172'0	176'7	181'3
Breaking-weight per sup. foot in lbs.	15	194'8	189'8	184'8	179'8	174'7	169'5	164'3	159'0	153'7	148'4
Weight distributed in lbs.		1490	1600	1710	1820	1930	2040	2150	2260	2370	2480
Breaking-weight distributed in lbs.		2787	2974	3158	3339	3516	3691	3863	4032	4199	4363
Depth of beam in inches		7'232	7'391	7'541	7'682	7'816	7'943	8'064	8'180	8'291	8'398
Breadth of beam in inches		5'114	5'226	5'332	5'432	5'526	5'616	5'702	5'784	5'863	5'938
Sectional area in sup. feet	16	2'568	2'668	2'764	2'856	2'944	3'028	3'108	3'185	3'258	3'327
Contents in cubic feet		3'596	3'755	3'909	4'056	4'199	4'337	4'470	4'600	4'726	4'849
Weight in lbs.		161'9	169'0	175'9	182'5	188'9	195'1	201'1	207'0	212'6	218'0
Breaking-weight per sup. foot in lbs.		198'5	193'8	189'4	184'9	180'6	176'3	171'9	167'5	163'0	158'5
Weight distributed in lbs.		1540	1660	1780	1900	2020	2140	2260	2380	2500	2620
Breaking-weight distributed in lbs.		3057	3253	3445	3633	3818	4000	4179	4355	4528	4698
Depth of beam in inches	17	7'617	7'784	7'943	8'090	8'231	8'365	8'492	8'615	8'732	8'844
Breadth of beam in inches		5'386	5'504	5'615	5'720	5'820	5'914	6'005	6'091	6'174	6'254
Sectional area in sup. feet		2'848	2'952	3'052	3'148	3'240	3'328	3'412	3'491	3'566	3'638
Contents in cubic feet		4'273	4'462	4'645	4'820	4'989	5'153	5'312	5'466	5'615	5'761
Weight in lbs.		192'2	200'8	209'4	217'9	226'5	235'0	243'5	251'9	260'2	268'4
Breaking-weight per sup. foot in lbs.	18	201'9	197'6	193'7	189'2	184'9	180'6	176'3	171'9	167'5	163'0
Weight distributed in lbs.		1650	1780	1910	2040	2170	2300	2430	2560	2690	2820
Breaking-weight distributed in lbs.		3332	3537	3737	3933	4125	4314	4500	4683	4863	5041
Depth of beam in inches		8'004	8'170	8'335	8'491	8'639	8'779	8'913	9'042	9'165	9'283
Breadth of beam in inches		5'553	5'777	5'999	6'211	6'423	6'635	6'847	7'059	7'271	7'483
Sectional area in sup. feet	19	3'138	3'277	3'411	3'540	3'665	3'785	3'901	4'014	4'124	4'231
Contents in cubic feet		5'021	5'244	5'458	5'664	5'863	6'056	6'244	6'428	6'608	6'777
Weight in lbs.		226'0	236'0	245'6	254'9	263'8	272'5	280'9	289'0	296'9	304'6
Breaking-weight per sup. foot in lbs.		205'2	200'8	196'8	192'4	188'0	183'6	179'2	174'8	170'4	166'0
Weight distributed in lbs.		1760	1920	2080	2240	2400	2560	2720	2880	3040	3200
Breaking-weight distributed in lbs.		3513	3753	3989	4221	4449	4673	4893	5109	5321	5529
Depth of beam in inches	20	8'366	8'550	8'723	8'886	9'041	9'188	9'328	9'463	9'591	9'715
Breadth of beam in inches		5'916	6'046	6'168	6'283	6'393	6'497	6'596	6'691	6'782	6'869
Sectional area in sup. feet		3'437	3'590	3'736	3'877	4'013	4'145	4'272	4'396	4'517	4'635
Contents in cubic feet		5'843	6'102	6'351	6'590	6'820	7'041	7'253	7'457	7'653	7'841
Weight in lbs.		282'9	294'6	306'2	317'9	329'6	341'3	353'0	364'6	376'2	387'8
Breaking-weight per sup. foot in lbs.	21	208'4	203'9	199'8	195'6	191'4	187'2	183'0	178'7	174'5	170'3
Weight distributed in lbs.		1870	2040	2210	2380	2550	2720	2890	3060	3230	3400
Breaking-weight distributed in lbs.		3897	4160	4417	4669	4917	5161	5401	5638	5873	6102
Depth of beam in inches		8'733	8'925	9'105	9'275	9'437	9'590	9'737	9'877	10'01	10'14
Breadth of beam in inches		6'175	6'310	6'438	6'558	6'672	6'781	6'885	6'984	7'079	7'170
Sectional area in sup. feet	22	3'744	3'911	4'070	4'224	4'372	4'516	4'655	4'790	4'921	5'051
Contents in cubic feet		6'740	7'039	7'327	7'604	7'871	8'129	8'379	8'622	8'858	9'088
Weight in lbs.		363'3	381'7	399'4	416'6	433'3	449'5	465'2	480'5	495'4	510'0
Breaking-weight per sup. foot in lbs.		214'4	209'8	205'6	201'4	197'2	193'0	188'8	184'6	180'4	176'2
Weight distributed in lbs.		2090	2280	2470	2660	2850	3040	3230	3420	3610	3800
Breaking-weight distributed in lbs.		4478	4780	5076	5366	5651	5932	6207	6480	6748	7012
Depth of beam in inches	23	9'094	9'294	9'482	9'659	9'827	9'987	10'14	10'29	10'43	10'56
Breadth of beam in inches		6'430	6'571	6'704	6'830	6'949	7'062	7'169	7'273	7'372	7'467
Sectional area in sup. feet		4'060	4'241	4'415	4'582	4'743	4'898	5'048	5'193	5'333	5'468
Contents in cubic feet		7'716	8'050	8'388	8'720	9'046	9'367	9'683	9'994	10'301	10'604
Weight in lbs.		347'2	362'6	377'4	391'7	405'4	418'7	431'6	444'2	456'3	468'2
Breaking-weight per sup. foot in lbs.	24	214'2	209'6	205'5	201'7	197'8	193'9	189'9	185'9	181'9	177'9
Weight distributed in lbs.		2090	2280	2470	2660	2850	3040	3230	3420	3610	3800
Breaking-weight distributed in lbs.		4478	4780	5076	5366	5651	5932	6207	6480	6748	7012
Depth of beam in inches		9'451	9'659	9'854	10'04	10'21	10'38	10'54	10'69	10'83	10'97
Breadth of beam in inches		6'682	6'829	6'967	7'098	7'221	7'339	7'451	7'558	7'661	7'760
Sectional area in sup. feet	25	4'386	4'580	4'767	4'947	5'121	5'290	5'455	5'616	5'773	5'926
Contents in cubic feet		8'771	9'161	9'535	9'895	10'24	10'57	10'90	11'23	11'56	11'88
Weight in lbs.		394'7	413'1	430'8	447'8	464'3	480'5	496'3	511'7	526'8	541'7
Breaking-weight per sup. foot in lbs.		217'0	212'4	208'1	204'3	200'8	197'6	194'6	191'9	189'3	186'9
Weight distributed in lbs.		2240	2400	2560	2720	2880	3040	3200	3360	3520	3680
Breaking-weight distributed in lbs.		4775	5097	5412	5721	6026	6325	6618	6905	7195	7477

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			21	22	23	24	25	26	27	28	29	30
Depth of beam	in inches	11	7.095	7.244	7.258	7.336	7.411	7.486	7.555	7.624	7.691	7.757
Breadth of beam	in inches		5.016	5.075	5.132	5.187	5.240	5.292	5.342	5.391	5.438	5.484
Sectional area	in sup. feet		2.472	2.530	2.586	2.643	2.695	2.750	2.802	2.851	2.905	2.954
Contents	in cubic feet		2.718	2.782	2.845	2.906	2.966	3.025	3.083	3.139	3.195	3.249
Weight	in lbs.		122.3	125.2	128.0	130.7	133.4	136.1	138.7	141.3	143.7	146.3
Breaking-weight per sup. foot	in lbs.	159.0	157.1	155.4	153.8	152.2	150.7	149.3	147.8	146.3	144.8	
Weight distributed	in lbs.	2310	2420	2530	2640	2750	2860	2970	3080	3190	3300	
Breaking-weight distributed	...	3673	3803	3932	4060	4185	4311	4435	4557	4679	4799	
Depth of beam	in inches	12	7.573	7.662	7.747	7.830	7.911	7.989	8.064	8.138	8.210	8.280
Breadth of beam	in inches		5.355	5.417	5.478	5.537	5.593	5.648	5.702	5.755	5.805	5.854
Sectional area	in sup. feet		2.816	2.882	2.947	3.010	3.073	3.134	3.193	3.252	3.309	3.366
Contents	in cubic feet		3.379	3.459	3.537	3.613	3.687	3.760	3.832	3.902	3.971	4.039
Weight	in lbs.		152.1	155.6	159.1	162.6	165.9	169.2	172.4	175.6	178.7	181.7
Breaking-weight per sup. foot	in lbs.	162.5	160.6	158.9	157.1	155.5	154.0	152.6	151.2	149.9	148.6	
Weight distributed	in lbs.	2520	2640	2760	2880	3000	3120	3240	3360	3480	3600	
Breaking-weight distributed	...	4095	4240	4384	4526	4667	4806	4944	5081	5216	5351	
Depth of beam	in inches	13	8.229	8.136	8.227	8.315	8.400	8.483	8.563	8.641	8.717	8.792
Breadth of beam	in inches		5.686	5.753	5.817	5.879	5.939	5.998	6.055	6.110	6.164	6.216
Sectional area	in sup. feet		3.175	3.250	3.320	3.385	3.445	3.503	3.561	3.617	3.672	3.725
Contents	in cubic feet		4.128	4.225	4.320	4.413	4.501	4.593	4.681	4.767	4.851	4.934
Weight	in lbs.		185.7	190.2	194.4	198.6	202.6	206.7	210.6	214.5	218.3	222.0
Breaking-weight per sup. foot	in lbs.	165.8	163.8	161.9	160.4	158.7	157.1	155.4	153.8	152.2	150.6	
Weight distributed	in lbs.	2730	2890	2990	3120	3250	3380	3510	3640	3770	3900	
Breaking-weight distributed	...	4526	4687	4846	5003	5158	5312	5465	5616	5766	5914	
Depth of beam	in inches	14	8.501	8.601	8.697	8.790	8.880	8.967	9.053	9.135	9.216	9.294
Breadth of beam	in inches		6.011	6.082	6.149	6.215	6.279	6.341	6.400	6.459	6.517	6.572
Sectional area	in sup. feet		3.549	3.632	3.714	3.794	3.872	3.949	4.024	4.098	4.170	4.242
Contents	in cubic feet		4.963	5.085	5.199	5.311	5.421	5.528	5.634	5.737	5.838	5.938
Weight	in lbs.		223.5	228.8	233.9	239.0	243.9	248.7	253.6	258.1	262.7	267.2
Breaking-weight per sup. foot	in lbs.	168.9	166.9	165.1	163.4	161.6	160.1	158.6	157.1	155.8	154.4	
Weight distributed	in lbs.	2940	3080	3220	3360	3500	3640	3780	3920	4060	4200	
Breaking-weight distributed	...	4965	5141	5300	5488	5659	5825	5995	6161	6325	6488	
Depth of beam	in inches	15	8.953	9.058	9.159	9.257	9.352	9.444	9.534	9.621	9.705	9.788
Breadth of beam	in inches		6.430	6.404	6.476	6.545	6.612	6.678	6.741	6.803	6.863	6.921
Sectional area	in sup. feet		3.936	4.028	4.119	4.208	4.294	4.379	4.465	4.545	4.625	4.704
Contents	in cubic feet		5.903	6.042	6.178	6.311	6.441	6.569	6.694	6.817	6.938	7.056
Weight	in lbs.		265.6	271.9	278.0	284.0	289.8	295.6	301.2	306.7	312.2	317.7
Breaking-weight per sup. foot	in lbs.	171.8	169.9	167.9	166.2	164.5	162.9	161.3	159.9	158.5	157.1	
Weight distributed	in lbs.	3150	3300	3450	3600	3750	3900	4050	4200	4350	4500	
Breaking-weight distributed	...	5412	5604	5795	5983	6168	6353	6535	6716	6895	7073	
Depth of beam	in inches	16	9.397	9.507	9.613	9.716	9.816	9.912	10.01	10.10	10.19	10.28
Breadth of beam	in inches		6.644	6.722	6.797	6.870	6.940	7.009	7.075	7.140	7.203	7.264
Sectional area	in sup. feet		4.336	4.438	4.538	4.635	4.731	4.825	4.916	5.007	5.095	5.182
Contents	in cubic feet		6.938	7.101	7.260	7.417	7.570	7.720	7.867	8.011	8.153	8.292
Weight	in lbs.		303.0	319.5	326.7	333.7	340.6	347.3	354.0	360.5	366.8	373.1
Breaking-weight per sup. foot	in lbs.	174.6	172.6	170.7	168.9	167.2	165.5	164.0	162.5	161.1	159.7	
Weight distributed	in lbs.	3360	3520	3680	3840	4000	4160	4320	4480	4640	4800	
Breaking-weight distributed	...	5867	6076	6282	6485	6687	6887	7085	7280	7475	7667	
Depth of beam	in inches	17	9.834	9.949	10.06	10.17	10.27	10.37	10.47	10.57	10.66	10.75
Breadth of beam	in inches		6.954	7.035	7.114	7.190	7.263	7.335	7.404	7.472	7.538	7.602
Sectional area	in sup. feet		4.748	4.860	4.970	5.076	5.181	5.284	5.384	5.483	5.580	5.676
Contents	in cubic feet		8.073	8.262	8.448	8.630	8.808	8.982	9.154	9.322	9.487	9.649
Weight	in lbs.		363.2	371.8	380.1	388.3	396.3	404.2	411.9	419.4	426.9	434.4
Breaking-weight per sup. foot	in lbs.	177.3	175.2	173.3	171.4	169.7	168.0	166.5	164.9	163.5	162.1	
Weight distributed	in lbs.	3570	3740	3910	4080	4250	4420	4590	4760	4930	5100	
Breaking-weight distributed	...	6329	6554	6777	6996	7213	7429	7642	7853	8063	8271	
Depth of beam	in inches	18	10.27	10.38	10.50	10.61	10.72	10.83	10.93	11.03	11.13	11.22
Breadth of beam	in inches		7.258	7.343	7.425	7.504	7.581	7.656	7.729	7.799	7.868	7.935
Sectional area	in sup. feet		5.174	5.295	5.414	5.531	5.645	5.757	5.866	5.974	6.080	6.184
Contents	in cubic feet		9.312	9.532	9.746	9.956	10.16	10.36	10.56	10.75	10.94	11.13
Weight	in lbs.		419.0	428.9	438.6	448.0	457.2	466.3	475.1	483.9	492.4	500.8
Breaking-weight per sup. foot	in lbs.	179.8	177.7	175.8	173.9	172.1	170.5	168.9	167.3	165.9	164.5	
Weight distributed	in lbs.	3780	3960	4140	4320	4500	4680	4860	5040	5220	5400	
Breaking-weight distributed	...	6798	7039	7278	7514	7747	7979	8208	8435	8660	8883	
Depth of beam	in inches	19	10.69	10.81	10.94	11.05	11.17	11.28	11.38	11.49	11.59	11.69
Breadth of beam	in inches		7.558	7.647	7.732	7.815	7.895	7.973	8.049	8.123	8.194	8.263
Sectional area	in sup. feet		5.611	5.743	5.872	5.999	6.122	6.243	6.362	6.479	6.594	6.707
Contents	in cubic feet		10.66	10.91	11.15	11.39	11.63	11.86	12.09	12.31	12.53	12.74
Weight	in lbs.		479.8	491.0	502.1	512.9	523.4	533.8	544.0	554.0	563.8	573.4
Breaking-weight per sup. foot	in lbs.	182.3	180.1	178.3	176.3	174.5	172.8	171.2	169.6	168.1	166.8	
Weight distributed	in lbs.	3990	4180	4370	4560	4750	4940	5130	5320	5510	5700	
Breaking-weight distributed	...	7273	7532	7787	8040	8290	8537	8782	9025	9266	9505	
Depth of beam	in inches	20	11.11	11.24	11.36	11.49	11.60	11.72	11.83	11.94	12.04	12.14
Breadth of beam	in inches		7.855	7.947	8.036	8.122	8.205	8.286	8.364	8.441	8.515	8.588
Sectional area	in sup. feet		6.059	6.202	6.342	6.478	6.611	6.742	6.871	6.997	7.121	7.243
Contents	in cubic feet		12.12	12.40	12.68	12.95	13.22	13.48	13.75	13.99	14.24	14.48
Weight	in lbs.		545.3	558.2	570.5	582.0	593.7	605.0	616.3	627.6	638.8	649.8
Breaking-weight per sup. foot	in lbs.	184.6	182.5	180.5	178.5	176.7	175.0	173.4	171.8	170.3	168.9	
Weight distributed	in lbs.	4200	4400	4600	4800	5000	5200	5400	5600	5800	6000	
Breaking-weight distributed	...	7755	8090	8393	8672	8938	9192	9434	9673	9909	10143	

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		3'1	3'2	3'3	3'4	3'5	3'6	3'7	3'8	3'9	4'0
Depth of beam in inches	11'	7'820	7'883	7'944	8'003	8'061	8'118	8'174	8'229	8'282	8'335
Breadth of beam in inches		5'530	5'574	5'617	5'659	5'700	5'740	5'780	5'818	5'856	5'893
Sectional area in sup. feet		3'003	3'051	3'098	3'145	3'191	3'236	3'281	3'324	3'378	3'411
Contents in cubic feet		3'303	3'356	3'408	3'460	3'510	3'559	3'609	3'657	3'705	3'752
Weight in lbs.		148'6	151'1	153'3	155'6	157'9	160'1	162'4	164'6	166'8	168'7
Breaking-weight per sup. foot in lbs.	12'	144'3	143'1	142'0	140'1	139'9	138'9	138'0	137'1	136'2	135'3
Weight distributed in lbs.		3410	3520	3630	3740	3850	3960	4070	4180	4290	4400
Breaking-weight distributed		4919	5038	5155	5272	5387	5503	5618	5730	5843	5955
Depth of beam in inches	13'	8'348	8'414	8'479	8'543	8'605	8'666	8'725	8'784	8'841	8'897
Breadth of beam in inches		5'903	5'950	5'995	6'040	6'084	6'127	6'169	6'211	6'251	6'291
Sectional area in sup. feet		3'422	3'476	3'530	3'583	3'636	3'687	3'738	3'788	3'838	3'887
Contents in cubic feet		4'106	4'172	4'237	4'300	4'363	4'425	4'486	4'546	4'605	4'664
Weight in lbs.		184'7	187'7	190'6	193'5	196'4	199'1	201'9	204'5	207'2	209'9
Breaking-weight per sup. foot in lbs.	14'	147'4	146'3	145'1	144'0	143'0	141'0	140'1	139'2	138'3	137'4
Weight distributed in lbs.		3720	3840	3960	4080	4200	4320	4440	4560	4680	4800
Breaking-weight distributed		5484	5616	5747	5878	6006	6135	6262	6389	6514	6639
Depth of beam in inches	15'	8'864	8'935	9'004	9'071	9'137	9'202	9'265	9'327	9'388	9'447
Breadth of beam in inches		6'268	6'318	6'366	6'414	6'461	6'506	6'551	6'595	6'638	6'680
Sectional area in sup. feet		3'858	3'920	3'982	4'041	4'099	4'158	4'215	4'271	4'327	4'382
Contents in cubic feet		5'016	5'096	5'175	5'253	5'329	5'405	5'480	5'553	5'626	5'697
Weight in lbs.		225'7	229'3	232'9	236'3	239'8	243'3	246'5	249'9	253'1	256'3
Breaking-weight per sup. foot in lbs.	16'	150'4	149'2	148'0	146'9	145'9	144'9	143'9	142'9	141'9	141'1
Weight distributed in lbs.		4030	4160	4290	4420	4550	4680	4810	4940	5070	5200
Breaking-weight distributed		6062	6208	6352	6496	6639	6781	6922	7061	7200	7338
Depth of beam in inches	17'	9'471	9'546	9'619	9'690	9'759	9'828	9'895	9'960	10'024	10'087
Breadth of beam in inches		6'626	6'679	6'730	6'781	6'830	6'878	6'926	6'972	7'017	7'062
Sectional area in sup. feet		4'312	4'381	4'449	4'516	4'582	4'646	4'711	4'774	4'836	4'898
Contents in cubic feet		6'036	6'133	6'228	6'322	6'414	6'505	6'595	6'684	6'771	6'857
Weight in lbs.		271'7	276'0	280'2	284'5	288'6	292'7	296'7	300'7	304'6	308'5
Breaking-weight per sup. foot in lbs.	18'	153'2	152'0	150'8	149'7	148'6	147'6	146'6	145'6	144'6	143'7
Weight distributed in lbs.		4340	4480	4620	4760	4900	5040	5180	5320	5460	5600
Breaking-weight distributed		6650	6810	6959	7127	7281	7439	7593	7747	7899	8051
Depth of beam in inches	19'	9'889	9'967	10'042	10'115	10'187	10'258	10'328	10'396	10'463	10'529
Breadth of beam in inches		6'978	7'034	7'088	7'141	7'193	7'244	7'294	7'342	7'389	7'437
Sectional area in sup. feet		4'782	4'858	4'934	5'008	5'081	5'153	5'224	5'294	5'363	5'432
Contents in cubic feet		7'173	7'288	7'401	7'512	7'621	7'730	7'836	7'941	8'045	8'148
Weight in lbs.		322'7	327'9	333'0	338'0	342'9	347'8	352'6	357'3	362'0	366'6
Breaking-weight per sup. foot in lbs.	20'	155'8	154'6	153'5	152'3	151'2	150'1	149'1	148'1	147'2	146'3
Weight distributed in lbs.		4650	4800	4950	5100	5250	5400	5550	5700	5850	6000
Breaking-weight distributed		7245	7424	7597	7769	7939	8109	8277	8444	8611	8776
Depth of beam in inches	21'	10'36	10'44	10'52	10'60	10'68	10'75	10'83	10'90	10'97	11'04
Breadth of beam in inches		7'324	7'382	7'439	7'495	7'549	7'604	7'655	7'706	7'757	7'806
Sectional area in sup. feet		5'268	5'353	5'435	5'517	5'598	5'677	5'755	5'833	5'910	5'985
Contents in cubic feet		8'429	8'564	8'697	8'828	8'956	9'084	9'210	9'333	9'454	9'575
Weight in lbs.		379'4	385'4	391'3	397'2	403'0	408'7	414'4	419'9	425'4	430'8
Breaking-weight per sup. foot in lbs.	22'	158'4	157'1	155'9	154'8	153'7	152'6	151'5	150'5	149'4	148'3
Weight distributed in lbs.		4960	5120	5280	5440	5600	5760	5920	6080	6240	6400
Breaking-weight distributed		7858	8048	8235	8422	8606	8791	8973	9154	9333	9513
Depth of beam in inches	23'	10'84	10'93	11'01	11'09	11'17	11'25	11'33	11'41	11'48	11'55
Breadth of beam in inches		7'665	7'726	7'785	7'844	7'901	7'957	8'011	8'065	8'117	8'169
Sectional area in sup. feet		5'770	5'862	5'953	6'043	6'131	6'217	6'303	6'388	6'472	6'554
Contents in cubic feet		9'808	9'965	10'12	10'27	10'42	10'57	10'72	10'86	11'00	11'14
Weight in lbs.		441'3	448'4	455'4	462'2	468'9	475'6	482'2	488'7	495'0	501'3
Breaking-weight per sup. foot in lbs.	24'	160'8	159'5	158'3	157'1	156'0	154'9	153'8	152'6	151'5	150'4
Weight distributed in lbs.		5770	5940	6110	6280	6450	6620	6790	6960	7130	7300
Breaking-weight distributed		8476	8681	8884	9085	9284	9476	9670	9857	10040	10220
Depth of beam in inches	25'	11'31	11'40	11'49	11'58	12'06	12'14	12'23	12'31	12'39	12'46
Breadth of beam in inches		8'000	8'064	8'126	8'187	8'247	8'305	8'362	8'418	8'473	8'527
Sectional area in sup. feet		6'286	6'387	6'486	6'583	6'677	6'770	6'861	6'950	7'038	7'124
Contents in cubic feet		11'31	11'49	11'67	11'85	12'03	12'21	12'36	12'52	12'69	12'86
Weight in lbs.		509'1	517'3	525'3	533'2	541'0	548'6	556'2	563'7	571'0	578'3
Breaking-weight per sup. foot in lbs.	26'	163'1	161'9	160'6	159'4	158'2	157'1	156'1	155'0	154'0	153'1
Weight distributed in lbs.		5890	6060	6230	6400	6570	6740	6910	7080	7250	7420
Breaking-weight distributed		9104	9324	9541	9755	9971	10180	10390	10600	10820	11020
Depth of beam in inches	27'	11'78	11'88	11'97	12'06	12'15	12'23	12'31	12'40	12'48	12'55
Breadth of beam in inches		8'331	8'398	8'463	8'526	8'588	8'649	8'708	8'766	8'823	8'880
Sectional area in sup. feet		6'817	6'927	7'034	7'140	7'244	7'347	7'448	7'548	7'647	7'744
Contents in cubic feet		12'95	13'16	13'36	13'56	13'76	13'96	14'15	14'34	14'53	14'71
Weight in lbs.		582'8	592'2	601'4	610'4	619'3	628'1	636'8	645'3	653'8	662'1
Breaking-weight per sup. foot in lbs.	28'	165'3	164'1	162'8	161'6	160'4	159'3	158'2	157'1	156'1	155'1
Weight distributed in lbs.		5890	6060	6230	6400	6570	6740	6910	7080	7250	7420
Breaking-weight distributed		9741	9969	10210	10440	10670	10900	11120	11340	11570	11790
Depth of beam in inches	29'	12'24	12'34	12'44	12'53	12'62	12'71	12'80	12'88	12'97	13'05
Breadth of beam in inches		8'658	8'727	8'795	8'861	8'925	8'988	9'050	9'110	9'170	9'228
Sectional area in sup. feet		7'933	8'050	8'165	8'279	8'391	8'502	8'612	8'721	8'829	8'936
Contents in cubic feet		14'73	14'96	15'19	15'42	15'64	15'86	16'08	16'30	16'51	16'72
Weight in lbs.		662'6	673'2	683'6	693'9	704'0	714'0	723'9	733'6	743'2	752'6
Breaking-weight per sup. foot in lbs.	30'	167'5	166'2	164'9	163'7	162'5	161'3	160'2	159'2	158'2	157'1
Weight distributed in lbs.		6300	6400	6500	6600	6700	6800	6900	7000	7100	7200
Breaking-weight distributed		10380	10630	10880	11130	11380	11620	11860	12100	12340	12570

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre = S.									
			4'1	4'2	4'3	4'4	4'5	4'6	4'7	4'8	4'9	5'0
Depth of beam	in inches	11'	8'386	8'437	8'487	8'536	8'584	8'631	8'678	8'723	8'758	8'813
Breadth of beam	in inches		5'930	5'966	6'001	6'035	6'069	6'103	6'136	6'168	6'200	6'231
Sectional area	in sup. feet		3'453	3'495	3'536	3'577	3'618	3'658	3'697	3'737	3'776	3'814
Contents	in cubic feet		3'799	3'845	3'891	3'936	3'980	4'024	4'067	4'110	4'153	4'195
Weight	in lbs.		170'9	175'0	179'1	183'2	187'1	191'0	194'9	198'8	202'6	206'5
Breaking-weight per sup. foot	in lbs.	134'5	133'7	132'9	132'2	131'4	130'7	130'0	129'3	128'6	128'0	
Weight distributed	in lbs.	4510	4620	4730	4840	4950	5060	5170	5280	5390	5500	
Breaking-weight distributed	...	6066	6177	6287	6396	6505	6613	6721	6828	6935	7040	
Depth of beam	in inches	12'	8'952	9'006	9'059	9'111	9'163	9'213	9'263	9'312	9'360	9'407
Breadth of beam	in inches		6'330	6'368	6'405	6'442	6'479	6'515	6'550	6'584	6'618	6'652
Sectional area	in sup. feet		3'935	3'983	4'030	4'076	4'122	4'168	4'213	4'258	4'302	4'346
Contents	in cubic feet		4'722	4'779	4'836	4'892	4'947	5'002	5'056	5'109	5'162	5'215
Weight	in lbs.		212'5	215'0	218'9	222'6	226'2	229'7	233'1	236'4	239'7	243'0
Breaking-weight per sup. foot	in lbs.	137'5	136'0	135'9	135'0	134'3	133'5	132'8	132'2	131'4	130'8	
Weight distributed	in lbs.	4920	5040	5160	5280	5400	5520	5640	5760	5880	6000	
Breaking-weight distributed	...	6763	6887	7009	7131	7253	7373	7493	7612	7731	7849	
Depth of beam	in inches	13'	9'505	9'563	9'619	9'675	9'729	9'783	9'836	9'888	9'939	9'989
Breadth of beam	in inches		6'721	6'762	6'800	6'841	6'880	6'918	6'955	6'992	7'028	7'064
Sectional area	in sup. feet		4'437	4'491	4'544	4'596	4'648	4'700	4'751	4'801	4'851	4'900
Contents	in cubic feet		5'768	5'838	5'907	5'975	6'041	6'110	6'176	6'241	6'306	6'370
Weight	in lbs.		259'5	262'7	265'8	268'9	271'9	274'9	277'9	280'8	283'7	286'6
Breaking-weight per sup. foot	in lbs.	140'2	139'4	138'6	137'8	137'0	136'2	135'6	134'8	134'1	133'4	
Weight distributed	in lbs.	5330	5460	5590	5720	5850	5980	6110	6240	6370	6500	
Breaking-weight distributed	...	7476	7612	7747	7882	8016	8150	8282	8414	8545	8676	
Depth of beam	in inches	14'	10'05	10'11	10'17	10'22	10'29	10'34	10'39	10'45	10'50	10'56
Breadth of beam	in inches		7'106	7'149	7'191	7'232	7'273	7'313	7'352	7'391	7'429	7'467
Sectional area	in sup. feet		4'959	5'019	5'078	5'137	5'195	5'252	5'309	5'365	5'421	5'476
Contents	in cubic feet		6'942	7'026	7'109	7'192	7'273	7'353	7'433	7'512	7'589	7'666
Weight	in lbs.		312'4	316'1	319'9	323'6	327'2	330'9	334'4	338'0	341'5	345'0
Breaking-weight per sup. foot	in lbs.	142'8	142'0	141'2	140'3	139'6	138'8	138'1	137'3	136'6	135'9	
Weight distributed	in lbs.	5740	5880	6020	6160	6300	6440	6580	6720	6860	7000	
Breaking-weight distributed	...	8201	8351	8499	8647	8794	8941	9086	9231	9374	9517	
Depth of beam	in inches	15'	10'58	10'65	10'71	10'77	10'83	10'89	10'95	11'00	11'06	11'12
Breadth of beam	in inches		7'483	7'528	7'573	7'616	7'659	7'702	7'743	7'784	7'824	7'864
Sectional area	in sup. feet		5'490	5'566	5'632	5'697	5'761	5'825	5'888	5'950	6'012	6'073
Contents	in cubic feet		8'249	8'349	8'448	8'545	8'642	8'738	8'832	8'926	9'018	9'110
Weight	in lbs.		371'2	375'1	380'1	384'5	388'9	393'2	397'4	401'6	405'8	409'9
Breaking-weight per sup. foot	in lbs.	145'3	144'5	143'6	142'8	142'0	141'2	140'4	139'7	139'0	138'3	
Weight distributed	in lbs.	6150	6300	6450	6600	6750	6900	7050	7200	7350	7500	
Breaking-weight distributed	...	8940	9103	9265	9426	9586	9746	9904	10063	10220	10375	
Depth of beam	in inches	16'	11'10	11'17	11'24	11'30	11'37	11'43	11'49	11'55	11'61	11'67
Breadth of beam	in inches		7'854	7'902	7'948	7'994	8'039	8'083	8'127	8'170	8'212	8'254
Sectional area	in sup. feet		6'058	6'132	6'204	6'276	6'347	6'417	6'487	6'555	6'623	6'691
Contents	in cubic feet		9'694	9'812	9'927	10'04	10'15	10'26	10'38	10'49	10'60	10'70
Weight	in lbs.		430'2	441'5	448'7	451'9	457'0	462'0	467'0	472'0	476'9	481'7
Breaking-weight per sup. foot	in lbs.	147'7	146'8	145'9	145'1	144'3	143'5	142'7	142'0	141'3	140'5	
Weight distributed	in lbs.	6560	6720	6880	7040	7200	7360	7520	7680	7840	8000	
Breaking-weight distributed	...	9691	9868	10044	10219	10392	10565	10737	10908	11078	11250	
Depth of beam	in inches	17'	11'62	11'70	11'76	11'84	11'89	11'96	12'03	12'09	12'15	12'21
Breadth of beam	in inches		8'220	8'269	8'318	8'366	8'413	8'460	8'505	8'550	8'594	8'638
Sectional area	in sup. feet		6'635	6'716	6'795	6'874	6'951	7'028	7'104	7'179	7'254	7'327
Contents	in cubic feet		11'28	11'41	11'55	11'68	11'81	11'94	12'07	12'20	12'34	12'45
Weight	in lbs.		507'5	513'7	519'8	525'8	531'1	537'6	543'4	549'2	554'9	560'7
Breaking-weight per sup. foot	in lbs.	150'0	149'1	148'2	147'3	146'5	145'7	144'9	144'1	143'4	142'7	
Weight distributed	in lbs.	6970	7140	7310	7480	7650	7820	7990	8160	8330	8500	
Breaking-weight distributed	...	10454	10650	10834	11023	11210	11394	11582	11765	11950	12132	
Depth of beam	in inches	18'	12'13	12'20	12'28	12'35	12'42	12'48	12'55	12'62	12'68	12'75
Breadth of beam	in inches		8'579	8'631	8'682	8'732	8'782	8'830	8'877	8'924	8'971	9'016
Sectional area	in sup. feet		7'229	7'317	7'403	7'489	7'574	7'657	7'740	7'822	7'903	7'983
Contents	in cubic feet		13'01	13'17	13'32	13'48	13'63	13'78	13'94	14'08	14'23	14'37
Weight	in lbs.		585'5	592'6	599'6	606'6	613'4	620'2	626'9	633'5	640'1	646'7
Breaking-weight per sup. foot	in lbs.	152'1	151'2	150'4	149'4	148'6	147'8	147'0	146'3	145'5	144'7	
Weight distributed	in lbs.	7380	7560	7740	7920	8100	8280	8460	8640	8820	9000	
Breaking-weight distributed	...	11230	11433	11638	11840	12040	12241	12440	12636	12834	13030	
Depth of beam	in inches	19'	12'63	12'71	12'78	12'86	12'93	13'01	13'07	13'14	13'21	13'28
Breadth of beam	in inches		8'935	8'989	9'042	9'094	9'145	9'195	9'245	9'294	9'342	9'389
Sectional area	in sup. feet		7'840	7'935	8'029	8'122	8'214	8'305	8'395	8'483	8'571	8'658
Contents	in cubic feet		14'90	15'07	15'25	15'43	15'60	15'78	15'95	16'13	16'30	16'45
Weight	in lbs.		670'3	678'5	686'4	694'4	702'4	710'1	717'7	725'3	732'9	740'3
Breaking-weight per sup. foot	in lbs.	154'2	153'3	152'4	151'5	150'7	149'8	149'0	148'3	147'5	146'7	
Weight distributed	in lbs.	7730	7980	8170	8360	8550	8740	8930	9120	9310	9500	
Breaking-weight distributed	...	12014	12234	12452	12667	12890	13100	13310	13520	13730	13940	
Depth of beam	in inches	20'	13'13	13'21	13'28	13'36	13'44	13'51	13'59	13'66	13'73	13'80
Breadth of beam	in inches		9'285	9'341	9'396	9'450	9'504	9'556	9'608	9'658	9'708	9'757
Sectional area	in sup. feet		8'467	8'570	8'671	8'771	8'870	8'969	9'068	9'165	9'262	9'358
Contents	in cubic feet		16'93	17'14	17'34	17'54	17'74	17'93	18'13	18'33	18'51	18'70
Weight	in lbs.		762'0	771'2	780'3	789'4	798'3	807'1	815'8	824'5	833'0	841'5
Breaking-weight per sup. foot	in lbs.	156'2	155'3	154'3	153'5	152'6	151'8	150'9	150'0	149'4	148'6	
Weight distributed	in lbs.	8200	8400	8600	8800	9000	9200	9400	9600	9800	10000	
Breaking-weight distributed	...	12809	13043	13280	13500	13730	13970	14200	14417	14643	14864	

Table No. VIII.—Burma Teak.

Deflection Formula.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
Depth of beam in inches	11	8.857	8.900	8.942	8.984	9.025	9.066	9.106	9.146	9.185	9.224
Breadth of beam in inches		6.202	6.203	6.203	6.203	6.203	6.203	6.203	6.203	6.203	6.203
Sectional area in sup. feet		3.852	3.852	3.852	3.852	3.852	3.852	3.852	3.852	3.852	3.852
Contents in cubic feet		4.237	4.237	4.237	4.237	4.237	4.237	4.237	4.237	4.237	4.237
Weight in lbs.		197.4	197.4	197.4	197.4	197.4	197.4	197.4	197.4	197.4	197.4
Breaking-weight per sup. foot in lbs.		127.4	127.4	127.4	127.4	127.4	127.4	127.4	127.4	127.4	127.4
Weight distributed in lbs.		5610	5610	5610	5610	5610	5610	5610	5610	5610	5610
Breaking-weight distributed		7145	7145	7145	7145	7145	7145	7145	7145	7145	7145
Depth of beam in inches	12	9.454	9.500	9.545	9.590	9.634	9.677	9.720	9.763	9.805	9.846
Breadth of beam in inches		6.685	6.717	6.749	6.781	6.812	6.843	6.873	6.903	6.933	6.962
Sectional area in sup. feet		4.389	4.432	4.474	4.516	4.558	4.599	4.640	4.680	4.721	4.760
Contents in cubic feet		5.267	5.318	5.369	5.419	5.469	5.519	5.568	5.616	5.665	5.713
Weight in lbs.		237.0	237.0	237.0	237.0	237.0	237.0	237.0	237.0	237.0	237.0
Breaking-weight per sup. foot in lbs.		130.1	129.5	128.9	128.3	127.7	127.1	126.6	126.0	125.5	125.0
Weight distributed in lbs.		6120	6240	6360	6480	6600	6720	6840	6960	7080	7200
Breaking-weight distributed		7966	8083	8200	8316	8432	8548	8664	8780	8896	9012
Depth of beam in inches	13	10.03	10.08	10.13	10.18	10.23	10.27	10.32	10.36	10.41	10.45
Breadth of beam in inches		7.098	7.133	7.167	7.201	7.234	7.266	7.299	7.331	7.363	7.395
Sectional area in sup. feet		4.949	4.997	5.045	5.092	5.139	5.185	5.232	5.277	5.323	5.368
Contents in cubic feet		6.433	6.498	6.563	6.628	6.692	6.756	6.819	6.882	6.945	6.999
Weight in lbs.		295.5	295.5	295.5	295.5	295.5	295.5	295.5	295.5	295.5	295.5
Breaking-weight per sup. foot in lbs.		132.8	132.3	131.8	131.3	130.8	130.3	129.8	129.3	128.8	128.3
Weight distributed in lbs.		6630	6760	6890	7020	7150	7280	7410	7540	7670	7800
Breaking-weight distributed		8805	8931	9057	9183	9309	9435	9561	9687	9813	9939
Depth of beam in inches	14	10.61	10.66	10.72	10.77	10.82	10.86	10.91	10.95	11.00	11.05
Breadth of beam in inches		7.504	7.541	7.577	7.614	7.650	7.686	7.722	7.758	7.794	7.830
Sectional area in sup. feet		5.530	5.585	5.639	5.693	5.747	5.801	5.854	5.908	5.961	6.015
Contents in cubic feet		7.743	7.818	7.893	7.967	8.041	8.115	8.188	8.261	8.334	8.407
Weight in lbs.		348.4	351.8	355.2	358.5	361.9	365.2	368.5	371.8	375.1	378.4
Breaking-weight per sup. foot in lbs.		135.3	134.6	133.9	133.2	132.5	131.8	131.1	130.4	129.7	129.0
Weight distributed in lbs.		7140	7280	7420	7560	7700	7840	7980	8120	8260	8400
Breaking-weight distributed		9660	9802	9943	10084	10225	10366	10507	10648	10789	10930
Depth of beam in inches	15	11.17	11.23	11.28	11.33	11.38	11.44	11.49	11.54	11.59	11.64
Breadth of beam in inches		7.903	7.941	7.979	8.017	8.054	8.091	8.128	8.165	8.202	8.239
Sectional area in sup. feet		6.133	6.193	6.253	6.311	6.369	6.427	6.484	6.541	6.598	6.655
Contents in cubic feet		9.200	9.290	9.379	9.467	9.554	9.640	9.727	9.811	9.896	9.979
Weight in lbs.		414.0	418.0	422.0	426.0	430.0	433.8	437.7	441.5	445.3	449.0
Breaking-weight per sup. foot in lbs.		137.6	136.9	136.2	135.5	134.8	134.1	133.4	132.7	132.0	131.3
Weight distributed in lbs.		7650	7800	7950	8100	8250	8400	8550	8700	8850	9000
Breaking-weight distributed		10530	10680	10830	10980	11130	11280	11430	11580	11730	11880
Depth of beam in inches	16	11.73	11.78	11.84	11.90	11.95	12.00	12.06	12.11	12.17	12.21
Breadth of beam in inches		8.235	8.285	8.335	8.384	8.433	8.481	8.529	8.576	8.623	8.670
Sectional area in sup. feet		6.757	6.824	6.890	6.955	7.019	7.083	7.146	7.209	7.271	7.334
Contents in cubic feet		10.81	10.92	11.02	11.12	11.23	11.33	11.43	11.53	11.63	11.73
Weight in lbs.		486.5	491.2	495.9	500.6	505.2	509.8	514.3	518.8	523.3	527.7
Breaking-weight per sup. foot in lbs.		139.8	139.2	138.5	137.8	137.1	136.4	135.7	135.0	134.3	133.6
Weight distributed in lbs.		8160	8320	8480	8640	8800	8960	9120	9280	9440	9600
Breaking-weight distributed		11410	11580	11750	11920	12090	12260	12430	12600	12770	12940
Depth of beam in inches	17	12.28	12.34	12.39	12.45	12.51	12.57	12.62	12.68	12.73	12.78
Breadth of beam in inches		8.681	8.723	8.765	8.806	8.846	8.886	8.925	8.964	9.003	9.041
Sectional area in sup. feet		7.400	7.473	7.544	7.615	7.685	7.754	7.823	7.892	7.960	8.028
Contents in cubic feet		12.58	12.70	12.83	12.95	13.07	13.19	13.30	13.41	13.53	13.65
Weight in lbs.		566.1	571.6	577.1	582.6	587.9	593.2	598.5	603.7	608.9	614.0
Breaking-weight per sup. foot in lbs.		142.0	141.3	140.7	140.0	139.4	138.7	138.1	137.5	136.9	136.3
Weight distributed in lbs.		8670	8840	9010	9180	9350	9520	9690	9860	10030	10200
Breaking-weight distributed		12310	12490	12670	12850	13030	13210	13390	13570	13750	13930
Depth of beam in inches	18	12.81	12.87	12.93	12.99	13.05	13.11	13.17	13.23	13.28	13.34
Breadth of beam in inches		9.061	9.105	9.148	9.191	9.233	9.275	9.316	9.357	9.398	9.439
Sectional area in sup. feet		8.063	8.141	8.219	8.297	8.373	8.448	8.524	8.598	8.672	8.745
Contents in cubic feet		14.51	14.65	14.79	14.93	15.07	15.21	15.34	15.47	15.61	15.74
Weight in lbs.		653.0	659.4	665.7	672.0	678.2	684.3	690.4	696.4	702.4	708.3
Breaking-weight per sup. foot in lbs.		144.0	143.3	142.6	141.9	141.3	140.6	139.9	139.2	138.5	137.8
Weight distributed in lbs.		9180	9360	9540	9720	9900	10080	10260	10440	10620	10800
Breaking-weight distributed		13220	13420	13610	13810	14000	14190	14380	14570	14760	14950
Depth of beam in inches	19	13.34	13.40	13.47	13.53	13.59	13.66	13.72	13.78	13.84	13.89
Breadth of beam in inches		9.436	9.482	9.527	9.572	9.616	9.659	9.702	9.744	9.786	9.827
Sectional area in sup. feet		8.744	8.830	8.914	8.998	9.081	9.163	9.245	9.325	9.405	9.485
Contents in cubic feet		16.60	16.77	16.93	17.09	17.25	17.41	17.56	17.71	17.87	18.02
Weight in lbs.		747.6	754.9	762.2	769.3	776.4	783.5	790.4	797.3	804.1	811.0
Breaking-weight per sup. foot in lbs.		146.0	145.3	144.6	143.9	143.3	142.6	142.0	141.4	140.8	140.2
Weight distributed in lbs.		9690	9880	10070	10260	10450	10640	10830	11020	11210	11400
Breaking-weight distributed		14150	14360	14560	14770	14970	15180	15380	15580	15780	15980
Depth of beam in inches	20	13.87	13.94	14.00	14.07	14.13	14.20	14.26	14.32	14.38	14.44
Breadth of beam in inches		9.806	9.854	9.901	9.947	9.993	10.038	10.083	10.127	10.171	10.215
Sectional area in sup. feet		9.443	9.535	9.627	9.717	9.807	9.896	9.985	10.073	10.161	10.249
Contents in cubic feet		18.88	19.07	19.25	19.43	19.61	19.79	19.96	20.14	20.31	20.48
Weight in lbs.		849.9	858.2	866.4	874.5	882.6	890.6	898.5	906.4	914.2	922.0
Breaking-weight per sup. foot in lbs.		148.0	147.2	146.5	145.8	145.1	144.4	143.7	143.0	142.3	141.6
Weight distributed in lbs.		10200	10400	10600	10800	11000	11200	11400	11600	11800	12000
Breaking-weight distributed		15080	15300	15520	15740	15960	16180	16400	16620	16840	17060

Table No. V.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formula.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0
Depth of beam	in inches	11'	9.262	9.300	9.337	9.374	9.410	9.446	9.483	9.517	9.550	9.585
Breadth of beam	in inches		6.549	6.576	6.602	6.628	6.654	6.679	6.705	6.730	6.754	6.779
Sectional area	in sup. feet		4.212	4.247	4.281	4.315	4.348	4.381	4.415	4.447	4.480	4.512
Contents	in cubic feet		4.633	4.671	4.709	4.746	4.783	4.820	4.856	4.892	4.928	4.963
Weight	in lbs.		208.5	210.2	211.9	213.6	215.2	216.9	218.5	220.1	221.7	223.4
Breaking-weight per sup. foot	in lbs.		121.8	121.3	120.8	120.3	119.8	119.4	118.9	118.5	118.1	117.6
Weight distributed	in lbs.		6710	6820	6930	7040	7150	7260	7370	7480	7590	7700
Breaking-weight distributed	...		8172	8273	8373	8473	8571	8670	8768	8866	8964	9061
Depth of beam	in inches	12'	9.886	9.927	9.964	10.000	10.035	10.070	10.105	10.139	10.173	10.207
Breadth of beam	in inches		6.991	7.019	7.047	7.075	7.103	7.130	7.157	7.183	7.210	7.235
Sectional area	in sup. feet		4.800	4.839	4.878	4.916	4.955	4.993	5.030	5.068	5.106	5.142
Contents	in cubic feet		5.760	5.807	5.853	5.900	5.946	5.991	6.037	6.082	6.126	6.170
Weight	in lbs.		259.2	261.3	263.4	265.5	267.5	269.6	271.7	273.6	275.7	277.6
Breaking-weight per sup. foot	in lbs.		124.5	123.9	123.4	123.0	122.5	122.0	121.5	121.1	120.7	120.3
Weight distributed	in lbs.		7320	7440	7560	7680	7800	7920	8040	8160	8280	8400
Breaking-weight distributed	...		9111	9224	9334	9445	9556	9666	9776	9885	9994	10100
Depth of beam	in inches	13'	10.50	10.54	10.58	10.62	10.67	10.70	10.74	10.78	10.82	10.87
Breadth of beam	in inches		7.423	7.454	7.483	7.513	7.542	7.571	7.600	7.628	7.656	7.683
Sectional area	in sup. feet		5.412	5.456	5.500	5.544	5.587	5.629	5.672	5.714	5.756	5.798
Contents	in cubic feet		7.036	7.093	7.150	7.207	7.263	7.318	7.374	7.428	7.483	7.537
Weight	in lbs.		316.6	319.2	321.7	324.3	326.8	329.3	331.8	334.2	336.7	339.1
Breaking-weight per sup. foot	in lbs.		127.0	126.5	126.0	125.4	125.0	124.5	124.0	123.6	123.1	122.7
Weight distributed	in lbs.		7930	8060	8190	8320	8450	8580	8710	8840	8970	9100
Breaking-weight distributed	...		10070	10192	10315	10440	10562	10684	10803	10924	11050	11165
Depth of beam	in inches	14'	11.10	11.15	11.18	11.23	11.28	11.31	11.36	11.41	11.44	11.49
Breadth of beam	in inches		7.948	7.980	7.911	7.942	7.973	8.004	8.034	8.064	8.093	8.122
Sectional area	in sup. feet		6.048	6.095	6.147	6.195	6.244	6.291	6.339	6.386	6.433	6.479
Contents	in cubic feet		8.468	8.537	8.605	8.674	8.741	8.808	8.875	8.942	9.006	9.071
Weight	in lbs.		381.0	384.1	387.2	390.3	393.3	396.3	399.3	402.3	405.2	408.2
Breaking-weight per sup. foot	in lbs.		129.3	128.9	128.3	127.8	127.3	126.8	126.3	125.9	125.4	125.0
Weight distributed	in lbs.		8540	8680	8820	8960	9100	9240	9380	9520	9660	9800
Breaking-weight distributed	...		11050	11183	11315	11444	11569	11700	11824	11956	12118	12250
Depth of beam	in inches	15'	11.68	11.73	11.78	11.82	11.87	11.92	11.96	12.01	12.06	12.09
Breadth of beam	in inches		8.265	8.300	8.331	8.364	8.397	8.429	8.461	8.492	8.523	8.554
Sectional area	in sup. feet		6.708	6.763	6.817	6.871	6.924	6.977	7.030	7.082	7.134	7.185
Contents	in cubic feet		10.06	10.14	10.22	10.31	10.38	10.46	10.55	10.63	10.70	10.77
Weight	in lbs.		452.8	457.3	461.7	466.1	470.4	474.7	478.9	483.0	487.5	491.0
Breaking-weight per sup. foot	in lbs.		131.6	131.1	130.5	130.1	129.5	129.0	128.6	128.1	127.6	127.1
Weight distributed	in lbs.		9150	9300	9450	9600	9750	9900	10050	10200	10350	10500
Breaking-weight distributed	...		12040	12190	12340	12484	12630	12777	12921	13070	13210	13355
Depth of beam	in inches	16'	12.26	12.31	12.36	12.41	12.46	12.51	12.55	12.60	12.65	12.69
Breadth of beam	in inches		8.674	8.710	8.745	8.779	8.813	8.847	8.880	8.913	8.946	8.978
Sectional area	in sup. feet		7.390	7.451	7.510	7.570	7.629	7.687	7.745	7.802	7.859	7.916
Contents	in cubic feet		11.82	11.92	12.01	12.11	12.20	12.30	12.39	12.48	12.57	12.66
Weight	in lbs.		532.1	536.4	540.7	545.0	549.2	553.4	557.6	561.7	565.9	570.0
Breaking-weight per sup. foot	in lbs.		133.7	133.2	132.7	132.2	131.6	131.1	130.7	130.1	129.7	129.2
Weight distributed	in lbs.		9760	9920	10080	10240	10400	10560	10720	10880	11040	11200
Breaking-weight distributed	...		13050	13220	13374	13535	13694	13851	14008	14164	14320	14475
Depth of beam	in inches	17'	12.83	12.89	12.95	12.99	13.04	13.10	13.14	13.19	13.24	13.28
Breadth of beam	in inches		9.079	9.115	9.151	9.188	9.223	9.259	9.294	9.328	9.363	9.396
Sectional area	in sup. feet		8.093	8.160	8.225	8.290	8.355	8.418	8.482	8.545	8.608	8.670
Contents	in cubic feet		13.76	13.87	13.98	14.10	14.20	14.31	14.42	14.53	14.63	14.74
Weight	in lbs.		619.1	624.2	629.2	634.1	639.1	644.0	648.9	653.7	658.5	663.2
Breaking-weight per sup. foot	in lbs.		135.8	135.3	134.7	134.1	133.7	133.1	132.6	132.2	131.6	131.2
Weight distributed	in lbs.		10370	10540	10710	10880	11050	11220	11390	11560	11730	11900
Breaking-weight distributed	...		14080	14260	14430	14600	14770	14940	15110	15280	15447	15614
Depth of beam	in inches	18'	13.40	13.45	13.50	13.56	13.62	13.66	13.71	13.76	13.82	13.87
Breadth of beam	in inches		9.475	9.514	9.552	9.590	9.627	9.664	9.700	9.736	9.773	9.807
Sectional area	in sup. feet		8.818	8.890	8.961	9.032	9.103	9.172	9.241	9.310	9.378	9.446
Contents	in cubic feet		15.87	16.00	16.13	16.26	16.38	16.51	16.64	16.75	16.88	17.00
Weight	in lbs.		714.2	720.0	725.8	731.5	737.3	742.9	748.5	754.0	759.6	765.1
Breaking-weight per sup. foot	in lbs.		137.8	137.2	136.6	136.1	135.6	135.0	134.5	134.0	133.5	133.1
Weight distributed	in lbs.		10980	11160	11340	11520	11700	11880	12060	12240	12420	12600
Breaking-weight distributed	...		15120	15320	15494	15680	15865	16046	16229	16410	16590	16770
Depth of beam	in inches	19'	13.95	14.01	14.07	14.12	14.17	14.23	14.28	14.34	14.39	14.44
Breadth of beam	in inches		9.868	9.909	9.947	9.987	10.026	10.064	10.102	10.140	10.177	10.214
Sectional area	in sup. feet		9.563	9.642	9.719	9.796	9.872	9.947	10.021	10.095	10.168	10.241
Contents	in cubic feet		18.17	18.32	18.46	18.61	18.75	18.90	19.04	19.18	19.32	19.46
Weight	in lbs.		817.7	824.4	830.9	837.6	844.1	850.5	856.9	863.3	869.6	875.9
Breaking-weight per sup. foot	in lbs.		139.7	139.0	138.5	137.9	137.5	136.9	136.4	135.9	135.4	134.9
Weight distributed	in lbs.		11500	11780	11970	12160	12350	12540	12730	12920	13110	13300
Breaking-weight distributed	...		16190	16383	16581	16776	16970	17170	17367	17558	17752	17944
Depth of beam	in inches	20'	14.50	14.56	14.62	14.67	14.73	14.80	14.84	14.90	14.95	15.01
Breadth of beam	in inches		10.25	10.29	10.33	10.38	10.42	10.45	10.50	10.53	10.57	10.61
Sectional area	in sup. feet		1.033	1.041	1.050	1.057	1.066	1.074	1.082	1.090	1.098	1.106
Contents	in cubic feet		20.66	20.82	20.96	21.10	21.25	21.39	21.53	21.67	21.80	21.96
Weight	in lbs.		929.5	937.1	944.3	951.0	957.5	964.8	971.8	978.7	985.6	992.5
Breaking-weight per sup. foot	in lbs.		141.4	140.8	140.3	139.7	139.2	138.7	138.1	137.6	137.1	136.6
Weight distributed	in lbs.		12200	12400	12600	12800	13000	13200	13400	13600	13800	14000
Breaking-weight distributed	...		17250	17468	17678	17888	18098	18305	18514	18720	18930	19131

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_a = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0
Depth of beam in inches	11'	9.620	9.654	9.687	9.720	9.753	9.785	9.818	9.849	9.880	9.912
Breadth of beam in inches		6.802	6.826	6.850	6.873	6.896	6.919	6.942	6.964	6.986	7.009
Sectional area in sup. feet		4.544	4.576	4.608	4.640	4.671	4.702	4.733	4.763	4.794	4.824
Contents in cubic feet		4.999	5.034	5.069	5.103	5.138	5.172	5.206	5.239	5.273	5.306
Weight in lbs.		225.0	226.5	228.1	229.7	231.3	232.7	234.2	235.8	237.3	238.8
Breaking-weight per sup. foot in lbs.	12'	117.3	116.8	116.5	116.0	115.7	115.2	114.9	114.5	114.1	113.8
Weight distributed in lbs.		7810	7920	8030	8140	8250	8360	8470	8580	8690	8800
Breaking-weight distributed		9158	9255	9351	9447	9542	9637	9733	9828	9921	10010
Depth of beam in inches	13'	10.96	10.91	10.86	10.81	10.76	10.71	10.66	10.61	10.56	10.51
Breadth of beam in inches		7.263	7.287	7.312	7.337	7.361	7.385	7.410	7.434	7.458	7.481
Sectional area in sup. feet		5.178	5.215	5.251	5.287	5.322	5.358	5.393	5.428	5.462	5.497
Contents in cubic feet		6.214	6.258	6.301	6.344	6.387	6.429	6.472	6.513	6.555	6.596
Weight in lbs.		279.6	281.6	283.5	285.5	287.4	289.3	291.2	293.1	294.9	296.8
Breaking-weight per sup. foot in lbs.	14'	119.8	119.4	119.0	118.6	118.2	117.8	117.4	117.0	116.7	116.3
Weight distributed in lbs.		8520	8640	8760	8880	9000	9120	9240	9360	9480	9600
Breaking-weight distributed		10210	10320	10430	10530	10630	10740	10850	10950	11060	11160
Depth of beam in inches	15'	12.14	12.18	12.22	12.26	12.31	12.34	12.39	12.42	12.46	12.51
Breadth of beam in inches		8.584	8.614	8.644	8.674	8.703	8.732	8.760	8.788	8.816	8.844
Sectional area in sup. feet		7.237	7.288	7.338	7.388	7.438	7.487	7.536	7.585	7.634	7.682
Contents in cubic feet		10.85	10.93	11.00	11.08	11.15	11.23	11.30	11.38	11.45	11.52
Weight in lbs.		488.5	491.9	495.3	498.7	502.0	505.4	508.7	512.0	515.3	518.6
Breaking-weight per sup. foot in lbs.	16'	126.7	126.2	125.8	125.4	125.0	124.5	124.2	123.7	123.4	123.0
Weight distributed in lbs.		10650	10800	10950	11100	11250	11400	11550	11700	11850	12000
Breaking-weight distributed		13490	13630	13780	13920	14060	14200	14340	14480	14620	14760
Depth of beam in inches	17'	13.34	13.38	13.43	13.47	13.51	13.56	13.60	13.65	13.69	13.73
Breadth of beam in inches		9.429	9.463	9.495	9.527	9.559	9.591	9.622	9.653	9.684	9.715
Sectional area in sup. feet		8.732	8.793	8.854	8.914	8.974	9.034	9.093	9.152	9.210	9.269
Contents in cubic feet		14.84	14.94	15.05	15.15	15.25	15.35	15.45	15.55	15.65	15.75
Weight in lbs.		667.9	672.6	677.3	681.9	686.5	691.0	695.6	700.1	704.5	709.0
Breaking-weight per sup. foot in lbs.	18'	130.7	130.2	129.8	129.4	129.0	128.6	128.2	127.7	127.3	126.9
Weight distributed in lbs.		12070	12240	12410	12580	12750	12920	13090	13260	13430	13600
Breaking-weight distributed		15780	15940	16100	16270	16440	16600	16770	16930	17090	17260
Depth of beam in inches	19'	13.91	13.97	14.01	14.07	14.11	14.16	14.20	14.25	14.29	14.34
Breadth of beam in inches		9.842	9.876	9.911	9.944	9.978	10.011	10.044	10.077	10.110	10.143
Sectional area in sup. feet		9.073	9.134	9.194	9.254	9.314	9.374	9.434	9.493	9.552	9.611
Contents in cubic feet		17.12	17.24	17.36	17.48	17.60	17.71	17.83	17.95	18.06	18.17
Weight in lbs.		770.5	775.9	781.3	786.7	792.1	797.5	802.9	808.3	813.7	819.0
Breaking-weight per sup. foot in lbs.	20'	132.6	132.2	131.7	131.3	130.8	130.4	129.9	129.5	129.2	128.7
Weight distributed in lbs.		12780	12960	13140	13320	13500	13680	13860	14040	14220	14400
Breaking-weight distributed		16990	17160	17340	17520	17700	17870	18050	18230	18400	18580
Depth of beam in inches	21'	14.49	14.54	14.59	14.64	14.69	14.74	14.80	14.85	14.88	14.93
Breadth of beam in inches		10.25	10.29	10.33	10.36	10.39	10.43	10.46	10.49	10.52	10.56
Sectional area in sup. feet		1.031	1.038	1.046	1.053	1.060	1.067	1.074	1.081	1.088	1.095
Contents in cubic feet		19.60	19.74	19.87	20.01	20.14	20.28	20.41	20.54	20.68	20.81
Weight in lbs.		882.1	887.3	892.5	897.6	902.7	907.8	912.9	917.9	923.0	928.1
Breaking-weight per sup. foot in lbs.	22'	134.8	134.0	133.5	133.1	132.6	132.2	131.7	131.3	130.9	130.4
Weight distributed in lbs.		13490	13680	13870	14060	14250	14440	14630	14820	15010	15200
Breaking-weight distributed		18130	18330	18510	18710	18890	19080	19270	19460	19650	19840
Depth of beam in inches	23'	15.06	15.11	15.16	15.22	15.27	15.32	15.37	15.42	15.47	15.51
Breadth of beam in inches		10.65	10.69	10.73	10.76	10.79	10.83	10.87	10.90	10.94	10.97
Sectional area in sup. feet		1.114	1.123	1.130	1.137	1.145	1.152	1.160	1.167	1.175	1.182
Contents in cubic feet		22.29	22.44	22.60	22.75	22.90	23.05	23.20	23.35	23.50	23.65
Weight in lbs.		1003.3	1009.2	1015.1	1021.0	1026.9	1032.8	1038.7	1044.6	1050.5	1056.4
Breaking-weight per sup. foot in lbs.	24'	138.2	137.7	137.3	136.8	136.4	135.9	135.4	135.0	134.5	134.2
Weight distributed in lbs.		14200	14400	14600	14800	15000	15200	15400	15600	15800	16000
Breaking-weight distributed		19830	19940	20050	20160	20270	20380	20490	20600	20710	20820

Table No. VIII.—Burma Teak.

$$P_b = 800$$

$$E_a = 3900$$

$$\frac{a}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0
Depth of beam	in inches	11'	9.942	9.973	10.00	10.03	10.06	10.10	10.12	10.15	10.18	10.20
Breadth of beam	in inches		7.031	7.052	7.073	7.095	7.116	7.138	7.157	7.178	7.198	7.218
Sectional area	in sup. feet		.4854	.4884	.4914	.4944	.4972	.5001	.5031	.5059	.5088	.5117
Contents	in cubic feet		5.339	5.372	5.405	5.437	5.470	5.502	5.534	5.565	5.597	5.628
Weight	in lbs.		240.2	241.7	243.3	244.7	246.1	247.5	248.9	250.4	251.8	253.2
Breaking-weight per sup. foot	in lbs.	113.4	113.1	112.8	112.4	112.1	111.7	111.5	111.1	110.8	110.5	
Weight distributed	in lbs.	8910	9020	9130	9240	9350	9460	9570	9680	9790	9900	
Breaking-weight distributed	...	10110	10200	10290	10380	10480	10570	10670	10750	10850	10940	
Depth of beam	in inches	12'	10.61	10.65	10.67	10.71	10.74	10.77	10.80	10.83	10.87	10.90
Breadth of beam	in inches		7.504	7.527	7.550	7.573	7.596	7.618	7.640	7.662	7.683	7.705
Sectional area	in sup. feet		.5531	.5565	.5599	.5633	.5666	.5699	.5732	.5765	.5798	.5830
Contents	in cubic feet		6.638	6.678	6.719	6.759	6.799	6.840	6.879	6.919	6.958	6.996
Weight	in lbs.		298.6	300.5	302.3	304.1	305.9	307.7	309.5	311.9	313.1	314.8
Breaking-weight per sup. foot	in lbs.	115.9	115.6	115.2	114.9	114.6	114.2	113.9	113.6	113.3	112.9	
Weight distributed	in lbs.	9720	9840	9960	10080	10200	10320	10440	10560	10680	10800	
Breaking-weight distributed	...	11270	11370	11480	11590	11690	11790	11890	11990	12090	12190	
Depth of beam	in inches	13'	11.27	11.30	11.33	11.37	11.41	11.44	11.47	11.50	11.54	11.57
Breadth of beam	in inches		7.969	7.993	8.017	8.042	8.065	8.089	8.112	8.136	8.159	8.181
Sectional area	in sup. feet		.6237	.6275	.6313	.6351	.6388	.6426	.6464	.6501	.6533	.6574
Contents	in cubic feet		8.108	8.158	8.207	8.257	8.305	8.354	8.403	8.451	8.499	8.546
Weight	in lbs.		364.8	367.1	369.3	371.6	373.7	375.9	378.1	380.3	382.4	384.6
Breaking-weight per sup. foot	in lbs.	118.4	117.9	117.5	117.3	116.8	116.5	116.2	115.9	115.5	115.2	
Weight distributed	in lbs.	10530	10650	10770	10890	11010	11130	11250	11370	11490	11610	
Breaking-weight distributed	...	12450	12570	12690	12810	12920	13030	13140	13250	13370	13480	
Depth of beam	in inches	14'	11.92	11.95	11.98	12.03	12.06	12.09	12.12	12.17	12.19	12.23
Breadth of beam	in inches		8.424	8.450	8.475	8.501	8.526	8.551	8.576	8.601	8.625	8.649
Sectional area	in sup. feet		.6970	.7013	.7056	.7098	.7140	.7182	.7223	.7265	.7306	.7347
Contents	in cubic feet		9.758	9.818	9.878	9.937	9.996	10.055	10.114	10.172	10.230	10.288
Weight	in lbs.		439.1	441.8	444.5	447.1	449.8	452.5	455.2	457.9	460.6	463.3
Breaking-weight per sup. foot	in lbs.	120.6	120.1	119.7	119.4	119.0	118.7	118.4	118.1	117.7	117.3	
Weight distributed	in lbs.	11340	11480	11620	11760	11900	12040	12180	12320	12460	12600	
Breaking-weight distributed	...	13660	13790	13910	14040	14170	14290	14420	14530	14660	14790	
Depth of beam	in inches	15'	12.54	12.58	12.62	12.66	12.70	12.74	12.77	12.81	12.84	12.88
Breadth of beam	in inches		8.872	8.899	8.926	8.953	8.979	9.006	9.032	9.058	9.083	9.109
Sectional area	in sup. feet		.7777	.7825	.7872	.7918	.7965	.8011	.8057	.8103	.8148	.8192
Contents	in cubic feet		11.59	11.66	11.73	11.81	11.87	11.94	12.01	12.08	12.15	12.22
Weight	in lbs.		521.7	524.9	528.1	531.3	534.5	537.6	540.8	543.8	546.8	550.0
Breaking-weight per sup. foot	in lbs.	122.6	122.2	121.8	121.5	121.1	120.8	120.4	120.1	119.7	119.4	
Weight distributed	in lbs.	12150	12300	12450	12600	12750	12900	13050	13200	13350	13500	
Breaking-weight distributed	...	14900	15040	15180	15310	15440	15580	15710	15850	15980	16120	
Depth of beam	in inches	16'	13.17	13.21	13.25	13.29	13.32	13.37	13.40	13.44	13.48	13.53
Breadth of beam	in inches		9.312	9.340	9.369	9.398	9.425	9.452	9.480	9.507	9.534	9.560
Sectional area	in sup. feet		.8516	.8568	.8620	.8672	.8723	.8775	.8826	.8876	.8927	.8977
Contents	in cubic feet		13.62	13.71	13.79	13.87	13.95	14.04	14.12	14.20	14.28	14.36
Weight	in lbs.		613.1	616.9	620.6	624.4	628.1	631.7	635.4	639.0	642.7	646.3
Breaking-weight per sup. foot	in lbs.	124.6	124.2	123.8	123.4	123.1	122.8	122.4	122.0	121.7	121.4	
Weight distributed	in lbs.	12860	13120	13390	13640	13800	13970	14130	14290	14440	14600	
Breaking-weight distributed	...	16150	16300	16450	16590	16740	16890	17030	17180	17330	17470	
Depth of beam	in inches	17'	13.78	13.82	13.85	13.90	13.94	13.99	14.03	14.07	14.11	14.15
Breadth of beam	in inches		9.745	9.775	9.805	9.834	9.863	9.892	9.921	9.949	9.977	10.00
Sectional area	in sup. feet		.9396	.9484	.9571	.9658	.9745	.9831	.9917	.9998	1.0084	1.0169
Contents	in cubic feet		15.85	15.95	16.05	16.15	16.24	16.34	16.43	16.52	16.62	16.72
Weight	in lbs.		713.4	718.5	723.7	728.5	733.3	738.1	742.9	747.8	752.6	757.4
Breaking-weight per sup. foot	in lbs.	126.5	126.1	125.7	125.4	125.0	124.6	124.2	123.9	123.5	123.2	
Weight distributed	in lbs.	13770	13940	14110	14280	14450	14620	14790	14960	15130	15300	
Breaking-weight distributed	...	17420	17680	17750	17900	18060	18220	18380	18540	18690	18850	
Depth of beam	in inches	18'	14.38	14.43	14.47	14.51	14.56	14.60	14.64	14.68	14.73	14.77
Breadth of beam	in inches		10.17	10.20	10.24	10.26	10.29	10.32	10.36	10.39	10.43	10.44
Sectional area	in sup. feet		1.016	1.029	1.040	1.051	1.063	1.074	1.083	1.093	1.105	1.117
Contents	in cubic feet		18.29	18.40	18.51	18.61	18.73	18.84	18.95	19.06	19.17	19.28
Weight	in lbs.		823.0	828.1	833.1	838.1	843.0	848.0	852.9	857.8	862.7	867.5
Breaking-weight per sup. foot	in lbs.	128.3	128.0	127.5	127.1	126.8	126.4	126.0	125.7	125.4	125.0	
Weight distributed	in lbs.	14580	14760	14940	15120	15300	15480	15660	15840	16020	16200	
Breaking-weight distributed	...	18750	19010	19100	19270	19440	19610	19780	19960	20120	20290	
Depth of beam	in inches	19'	14.98	15.02	15.07	15.11	15.16	15.21	15.25	15.29	15.33	15.38
Breadth of beam	in inches		10.60	10.62	10.65	10.69	10.72	10.75	10.78	10.82	10.84	10.87
Sectional area	in sup. feet		1.102	1.108	1.115	1.123	1.129	1.136	1.142	1.149	1.155	1.162
Contents	in cubic feet		20.94	21.06	21.19	21.32	21.45	21.57	21.70	21.82	21.95	22.07
Weight	in lbs.		942.2	948.0	953.8	959.5	965.2	970.8	976.5	982.0	987.7	993.2
Breaking-weight per sup. foot	in lbs.	131.7	129.6	129.2	128.9	128.5	128.1	127.7	127.3	126.9	126.7	
Weight distributed	in lbs.	15390	15580	15770	15960	16150	16340	16530	16720	16910	17100	
Breaking-weight distributed	...	20020	20200	20380	20570	20750	20940	21120	21300	21480	21660	
Depth of beam	in inches	20'	15.56	15.61	15.70	15.71	15.75	15.80	15.85	15.89	15.94	15.98
Breadth of beam	in inches		11.00	11.05	11.07	11.11	11.14	11.17	11.20	11.23	11.27	11.30
Sectional area	in sup. feet		1.190	1.197	1.204	1.212	1.219	1.226	1.234	1.241	1.248	1.254
Contents	in cubic feet		23.80	23.94	24.09	24.24	24.38	24.52	24.67	24.81	24.95	25.09
Weight	in lbs.		1071.7	1077.7	1084.0	1090.0	1097.0	1103.0	1110.0	1116.0	1123.0	1129.0
Breaking-weight per sup. foot	in lbs.	131.7	131.3	131.0	130.5	130.1	129.8	129.5	129.0	128.6	128.3	
Weight distributed	in lbs.	16200	16400	16600	16800	17000	17200	17400	17600	17800	18000	
Breaking-weight distributed	...	21340	21400	21740	21930	22130	22320	22510	22710	22900	23100	

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			21'	22'	23'	24'	25'	26'	27'	28'	29'	30'
Depth of beam	in inches	11'	12.61	12.76	12.91	13.05	13.18	13.31	13.44	13.56	13.68	13.79
Breadth of beam	in inches		8.922	9.025	9.127	9.224	9.319	9.411	9.500	9.572	9.661	9.750
Sectional area	in sup. feet		7517	8000	8180	8355	8528	8697	8863	9026	9185	9342
Contents	in cubic feet		8.597	8.800	8.998	9.191	9.381	9.566	9.749	9.928	10.107	10.277
Weight	in lbs.		386.9	396.0	404.9	413.6	422.1	430.5	438.7	446.8	454.7	462.4
Breaking-weight per sup. foot	in lbs.	89.42	88.39	87.71	86.49	85.61	84.77	83.97	83.22	82.50	81.81	
Weight distributed	in lbs.	23100	24200	25300	26400	27500	28600	29700	30800	31900	33000	
Breaking-weight distributed	...	20660	21380	22110	22830	23540	24240	24940	25630	26310	26990	
Depth of beam	in inches	12'	13.47	13.62	13.78	13.92	14.07	14.21	14.34	14.47	14.60	14.72
Breadth of beam	in inches		9.523	9.635	9.742	9.846	9.948	10.05	10.14	10.23	10.30	10.40
Sectional area	in sup. feet		8908	9116	9321	9522	9718	9910	1010	1029	1047	1065
Contents	in cubic feet		10.08	10.43	10.88	11.42	11.66	11.89	12.11	12.34	12.56	12.77
Weight	in lbs.		480.9	492.3	503.3	514.1	524.7	535.1	545.3	555.3	565.2	574.8
Breaking-weight per sup. foot	in lbs.	91.39	90.33	89.33	88.39	87.49	86.64	85.82	85.04	84.30	83.59	
Weight distributed	in lbs.	25200	26400	27600	28800	30000	31200	32400	33600	34800	36000	
Breaking-weight distributed	...	23020	23840	24650	25450	26250	27020	27800	28570	29330	30090	
Depth of beam	in inches	13'	14.30	14.47	14.63	14.79	14.94	15.09	15.23	15.37	15.50	15.64
Breadth of beam	in inches		10.11	10.23	10.35	10.46	10.56	10.67	10.77	10.86	10.94	11.04
Sectional area	in sup. feet		1004	1028	1051	1074	1096	1118	1139	1160	1180	1201
Contents	in cubic feet		13.05	13.36	13.65	13.95	14.24	14.53	14.80	15.07	15.34	15.60
Weight	in lbs.		587.5	601.3	614.8	628.0	641.0	653.7	666.1	678.4	690.4	702.2
Breaking-weight per sup. foot	in lbs.	93.23	92.16	91.14	90.18	89.26	88.39	87.55	86.76	86.00	85.28	
Weight distributed	in lbs.	27900	29000	30100	31200	32300	33400	34500	35600	36700	37800	
Breaking-weight distributed	...	25450	26350	27250	28130	29010	29870	30730	31580	32420	33260	
Depth of beam	in inches	14'	15.11	15.30	15.47	15.63	15.79	15.95	16.10	16.25	16.39	16.53
Breadth of beam	in inches		10.69	10.82	10.94	11.05	11.17	11.28	11.39	11.48	11.59	11.67
Sectional area	in sup. feet		1122	1149	1174	1200	1224	1249	1273	1296	1319	1342
Contents	in cubic feet		15.71	16.08	16.44	16.79	17.14	17.48	17.81	18.14	18.46	18.78
Weight	in lbs.		707.0	723.7	740.0	755.9	771.5	786.7	801.7	816.4	830.9	845.1
Breaking-weight per sup. foot	in lbs.	94.98	93.88	92.84	91.86	90.93	90.04	89.19	88.38	87.41	86.67	
Weight distributed	in lbs.	29400	30800	32200	33600	35000	36400	37800	39200	40600	42000	
Breaking-weight distributed	...	27920	28910	29890	30860	31820	32770	33710	34640	35570	36480	
Depth of beam	in inches	15'	15.92	16.11	16.29	16.46	16.63	16.79	16.95	17.11	17.26	17.41
Breadth of beam	in inches		11.26	11.39	11.42	11.64	11.76	11.88	11.99	12.08	12.19	12.30
Sectional area	in sup. feet		1245	1274	1303	1331	1358	1385	1411	1437	1463	1488
Contents	in cubic feet		18.07	19.10	19.53	19.96	20.38	20.77	21.17	21.55	21.94	22.31
Weight	in lbs.		840.1	859.0	879.2	898.1	916.7	934.8	952.6	970.1	987.3	1004
Breaking-weight per sup. foot	in lbs.	96.63	95.51	94.45	93.46	92.46	91.46	90.48	89.56	88.69	87.81	
Weight distributed	in lbs.	31500	33000	34500	36000	37500	39000	40500	42000	43500	45000	
Breaking-weight distributed	...	30430	31510	32590	33640	34690	35720	36750	37760	38770	39770	
Depth of beam	in inches	16'	16.71	16.91	17.09	17.28	17.45	17.63	17.79	17.96	18.12	18.27
Breadth of beam	in inches		11.82	11.96	12.09	12.22	12.34	12.47	12.58	12.68	12.79	12.91
Sectional area	in sup. feet		1371	1404	1435	1466	1496	1526	1555	1583	1611	1638
Contents	in cubic feet		21.94	22.45	22.96	23.45	23.94	24.41	24.87	25.33	25.78	26.22
Weight	in lbs.		987.3	1010	1033	1055	1077	1098	1119	1140	1160	1180
Breaking-weight per sup. foot	in lbs.	98.20	97.07	95.99	94.98	93.94	92.90	91.86	90.82	89.78	88.82	
Weight distributed	in lbs.	33900	35200	36500	37800	39100	40400	41700	43000	44300	45600	
Breaking-weight distributed	...	32900	34160	35320	36470	37600	38730	39840	40940	42030	43110	
Depth of beam	in inches	17'	17.49	17.69	17.89	18.08	18.27	18.45	18.63	18.79	18.96	19.12
Breadth of beam	in inches		12.37	12.51	12.66	12.79	12.92	13.05	13.17	13.27	13.40	13.52
Sectional area	in sup. feet		1502	1537	1572	1605	1639	1671	1703	1734	1765	1796
Contents	in cubic feet		25.53	26.13	26.71	27.29	27.85	28.40	28.94	29.47	30.00	30.51
Weight	in lbs.		1149	1176	1203	1228	1253	1278	1303	1326	1350	1373
Breaking-weight per sup. foot	in lbs.	99.70	98.55	97.46	96.43	95.45	94.52	93.56	92.72	91.90	91.13	
Weight distributed	in lbs.	35700	37400	39100	40800	42500	44200	45900	47600	49300	51000	
Breaking-weight distributed	...	35590	36850	38110	39340	40560	41770	42970	44160	45340	46510	
Depth of beam	in inches	18'	18.25	18.47	18.67	18.87	19.07	19.26	19.44	19.62	19.79	19.96
Breadth of beam	in inches		12.91	13.06	13.21	13.35	13.48	13.62	13.75	13.87	13.99	14.10
Sectional area	in sup. feet		1636	1674	1712	1749	1785	1821	1855	1889	1923	1956
Contents	in cubic feet		29.45	30.14	30.79	31.43	32.07	32.71	33.34	33.97	34.60	35.22
Weight	in lbs.		1325	1356	1387	1417	1446	1475	1503	1530	1557	1584
Breaking-weight per sup. foot	in lbs.	101.1	99.97	98.86	97.82	96.82	95.88	94.98	94.08	93.17	92.28	
Weight distributed	in lbs.	37800	39600	41400	43200	45000	46800	48600	50400	52200	54000	
Breaking-weight distributed	...	38310	39690	41030	42350	43670	44970	46260	47540	48810	50070	
Depth of beam	in inches	19'	19.01	19.23	19.44	19.65	19.86	20.05	20.24	20.43	20.61	20.78
Breadth of beam	in inches		13.44	13.60	13.75	13.89	14.04	14.18	14.32	14.46	14.59	14.72
Sectional area	in sup. feet		1775	1816	1857	1897	1936	1975	2012	2049	2085	2120
Contents	in cubic feet		33.71	34.51	35.28	36.04	36.78	37.51	38.23	38.93	39.62	40.29
Weight	in lbs.		1517	1553	1588	1622	1655	1688	1720	1752	1783	1813
Breaking-weight per sup. foot	in lbs.	102.5	101.3	100.2	99.15	98.14	97.19	96.20	95.33	94.50	93.70	
Weight distributed	in lbs.	39900	41800	43700	45600	47500	49400	51300	53200	55100	57000	
Breaking-weight distributed	...	40000	42350	43790	45290	46810	48310	49790	51250	52700	54150	
Depth of beam	in inches	20'	19.75	19.99	20.21	20.43	20.63	20.84	21.04	21.23	21.42	21.60
Breadth of beam	in inches		13.97	14.13	14.29	14.43	14.59	14.74	14.88	15.00	15.14	15.24
Sectional area	in sup. feet		1916	1961	2006	2049	2091	2133	2173	2213	2252	2292
Contents	in cubic feet		38.32	39.22	40.10	40.97	41.81	42.64	43.46	44.25	45.03	45.80
Weight	in lbs.		1725	1765	1805	1844	1881	1918	1955	1991	2027	2061
Breaking-weight per sup. foot	in lbs.	102.8	102.8	101.5	100.4	99.41	98.44	97.51	96.63	95.78	94.97	
Weight distributed	in lbs.	42000	44000	46000	48000	50000	52000	54000	56000	58000	60000	
Breaking-weight distributed	...	43610	45160	46690	48200	49700	51180	52650	54110	55550	56980	

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		1'1	1'2	1'3	1'4	1'5	1'6	1'7	1'8	1'9	2'0
Depth of beam in inches	21'	9'803	10'02	10'22	10'41	10'59	10'77	10'93	11'09	11'24	11'38
Breadth of beam in inches		8'931	7'084	7'227	7'363	7'490	7'612	7'728	7'840	7'946	8'049
Sectional area in sup. feet		4714	4928	5130	5323	5510	5691	5866	6036	6202	6362
Contents in cubic feet		9'910	10'35	10'77	11'18	11'57	11'95	12'32	12'68	13'02	13'36
Weight in lbs.		445'9	465'7	485'7	505'0	523'7	542'4	561'0	579'4	597'6	615'3
Breaking-weight per sup. foot in lbs.	21'	219'7	214'9	210'7	206'8	203'3	200'0	197'0	194'2	191'6	189'2
Weight distributed in lbs.		2310	2520	2730	2940	3150	3360	3570	3780	3990	4200
Breaking-weight distributed		5075	5417	5752	6082	6404	6722	7035	7343	7647	7947
Depth of beam in inches	22'	10'15	10'37	10'58	10'78	10'97	11'15	11'32	11'48	11'64	11'79
Breadth of beam in inches		7'178	7'335	7'484	7'624	7'756	7'882	8'003	8'118	8'223	8'335
Sectional area in sup. feet		5060	5285	5500	5708	5908	6102	6290	6473	6650	6822
Contents in cubic feet		11'13	11'62	12'10	12'55	13'00	13'42	13'84	14'24	14'63	15'01
Weight in lbs.		500'9	523'2	544'6	565'1	584'9	604'1	622'7	640'8	658'3	675'4
Breaking-weight per sup. foot in lbs.	22'	222'2	217'5	213'1	209'2	205'7	202'4	199'3	196'5	193'8	191'4
Weight distributed in lbs.		2420	2640	2860	3080	3300	3520	3740	3960	4180	4400
Breaking-weight distributed		5379	5742	6097	6445	6788	7125	7456	7783	8105	8423
Depth of beam in inches	23'	10'49	10'73	10'94	11'15	11'34	11'52	11'70	11'87	12'03	12'19
Breadth of beam in inches		7'421	7'584	7'737	7'882	8'019	8'150	8'274	8'393	8'507	8'617
Sectional area in sup. feet		5409	5649	5888	6126	6363	6599	6834	7068	7301	7534
Contents in cubic feet		12'44	12'99	13'53	14'03	14'53	15'00	15'46	15'91	16'35	16'77
Weight in lbs.		559'8	584'6	608'5	631'5	653'7	675'1	695'9	716'1	735'7	754'8
Breaking-weight per sup. foot in lbs.	23'	224'7	219'9	215'5	211'6	208'0	204'7	201'5	198'7	196'0	193'5
Weight distributed in lbs.		2530	2760	2990	3220	3450	3680	3910	4140	4370	4600
Breaking-weight distributed		5696	6070	6445	6814	7175	7531	7882	8230	8576	8920
Depth of beam in inches	24'	10'83	11'07	11'30	11'51	11'71	11'90	12'08	12'26	12'42	12'58
Breadth of beam in inches		7'662	7'830	7'988	8'138	8'280	8'414	8'543	8'666	8'784	8'897
Sectional area in sup. feet		5765	6021	6267	6504	6732	6953	7167	7375	7577	7774
Contents in cubic feet		13'84	14'45	15'04	15'61	16'15	16'68	17'20	17'70	18'18	18'65
Weight in lbs.		632'6	659'3	685'8	712'2	738'4	764'4	790'1	815'5	840'8	865'8
Breaking-weight per sup. foot in lbs.	24'	227'1	222'2	217'8	213'8	210'2	206'8	203'8	200'8	198'2	195'6
Weight distributed in lbs.		2640	2880	3120	3360	3600	3840	4080	4320	4560	4800
Breaking-weight distributed		5967	6401	6797	7186	7567	7944	8312	8677	9039	9400
Depth of beam in inches	25'	11'17	11'42	11'65	11'87	12'07	12'27	12'46	12'64	12'81	12'97
Breadth of beam in inches		7'900	8'073	8'237	8'391	8'537	8'676	8'808	8'935	9'057	9'173
Sectional area in sup. feet		6128	6400	6662	6913	7156	7391	7618	7839	8054	8264
Contents in cubic feet		15'32	16'00	16'66	17'28	17'89	18'48	19'05	19'60	20'14	20'66
Weight in lbs.		680'6	720'2	749'6	777'9	805'2	831'6	857'2	882'1	906'2	929'8
Breaking-weight per sup. foot in lbs.	25'	229'5	224'5	220'1	216'0	212'4	209'0	205'8	202'9	200'1	197'6
Weight distributed in lbs.		2750	3000	3250	3500	3750	4000	4250	4500	4750	5000
Breaking-weight distributed		6311	6737	7135	7522	7904	8280	8648	9011	9369	9722
Depth of beam in inches	26'	11'51	11'76	12'00	12'22	12'43	12'64	12'83	13'01	13'19	13'36
Breadth of beam in inches		8'133	8'314	8'482	8'641	8'792	8'935	9'071	9'202	9'327	9'447
Sectional area in sup. feet		6522	6884	7165	7436	7697	7949	8194	8432	8663	8888
Contents in cubic feet		16'90	17'65	18'37	19'07	19'73	20'38	21'01	21'62	22'21	22'79
Weight in lbs.		760'6	794'4	826'8	858'1	888'2	917'3	945'6	973'0	1000'7	1027'9
Breaking-weight per sup. foot in lbs.	26'	231'8	226'7	222'2	218'2	214'4	211'0	207'8	204'9	202'1	199'6
Weight distributed in lbs.		2860	3120	3380	3640	3900	4160	4420	4680	4940	5200
Breaking-weight distributed		6628	7075	7513	7942	8364	8779	9187	9590	9987	10380
Depth of beam in inches	27'	11'84	12'10	12'34	12'57	12'79	13'00	13'20	13'39	13'57	13'75
Breadth of beam in inches		8'369	8'553	8'726	8'889	9'044	9'191	9'331	9'466	9'595	9'719
Sectional area in sup. feet		6879	7257	7631	7991	8338	8673	8997	9311	9615	9910
Contents in cubic feet		18'57	19'40	20'19	20'95	21'69	22'40	23'09	23'76	24'41	25'04
Weight in lbs.		835'8	873'0	908'5	942'9	976'0	1008'8	1041'3	1073'5	1105'4	1137'0
Breaking-weight per sup. foot in lbs.	27'	233'9	228'9	224'4	220'2	216'5	213'0	209'8	206'8	204'0	201'4
Weight distributed in lbs.		2970	3240	3510	3780	4050	4320	4590	4860	5130	5400
Breaking-weight distributed		6948	7417	7876	8326	8768	9203	9631	10050	10470	10880
Depth of beam in inches	28'	12'17	12'43	12'68	12'92	13'14	13'36	13'56	13'75	13'95	14'12
Breadth of beam in inches		8'601	8'791	8'967	9'135	9'294	9'445	9'590	9'728	9'860	9'987
Sectional area in sup. feet		7265	7588	7908	8224	8536	8844	9148	9448	9744	10036
Contents in cubic feet		20'34	21'24	22'11	22'95	23'75	24'53	25'29	26'02	26'74	27'43
Weight in lbs.		915'4	956'1	995'1	1032'2	1069'0	1104'8	1139'8	1174'1	1207'8	1241'3
Breaking-weight per sup. foot in lbs.	28'	238'1	233'0	228'4	224'2	219'4	215'0	210'8	206'8	203'0	200'4
Weight distributed in lbs.		3080	3360	3640	3920	4200	4480	4760	5040	5320	5600
Breaking-weight distributed		7272	7762	8242	8713	9176	9631	10080	10520	10950	11380
Depth of beam in inches	29'	12'49	12'76	13'02	13'26	13'50	13'72	13'92	14'12	14'32	14'50
Breadth of beam in inches		8'830	9'024	9'207	9'379	9'542	9'697	9'845	9'987	10'12	10'25
Sectional area in sup. feet		7658	7999	8335	8666	8992	9314	9631	9944	10253	10558
Contents in cubic feet		22'21	23'19	24'14	25'05	25'93	26'78	27'61	28'41	29'18	29'94
Weight in lbs.		999'4	1043'2	1085'8	1128'2	1169'7	1210'4	1250'3	1289'5	1328'0	1365'8
Breaking-weight per sup. foot in lbs.	29'	239'9	234'0	228'4	224'2	219'4	215'0	210'8	206'8	203'0	200'4
Weight distributed in lbs.		3190	3480	3770	4060	4350	4640	4930	5220	5510	5800
Breaking-weight distributed		7597	8110	8612	9104	9588	10060	10520	10980	11440	11890
Depth of beam in inches	30'	12'81	13'08	13'35	13'61	13'84	14'07	14'28	14'49	14'68	14'87
Breadth of beam in inches		9'058	9'257	9'444	9'620	9'788	9'947	10'10	10'24	10'38	10'51
Sectional area in sup. feet		8057	8415	8759	9099	9435	9767	10095	10419	10739	11055
Contents in cubic feet		24'17	25'24	26'27	27'27	28'24	29'18	30'09	30'97	31'82	32'65
Weight in lbs.		1087'1	1136'8	1185'2	1232'2	1277'9	1323'4	1368'8	1414'1	1459'3	1504'4
Breaking-weight per sup. foot in lbs.	30'	240'2	233'0	226'4	221'2	216'2	211'4	206'8	202'4	198'0	193'6
Weight distributed in lbs.		3300	3600	3900	4200	4500	4800	5100	5400	5700	6000
Breaking-weight distributed		7927	8461	8984	9498	10000	10500	11000	11460	11940	12410

Table No. V.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			2'1	2'2	2'3	2'4	2'5	2'6	2'7	2'8	2'9	3'0
Depth of beam	in inches	21'	11'52	11'62	11'79	11'91	12'04	12'15	12'27	12'38	12'49	12'60
Breadth of beam	in inches		8'148	8'243	8'335	8'424	8'511	8'594	8'676	8'755	8'833	8'908
Sectional area	in sup. feet		6520	6673	6824	6970	7114	7253	7393	7529	7662	7793
Contents	in cubic feet		13'69	14'01	14'33	14'63	14'94	15'23	15'53	15'81	16'09	16'36
Weight	in lbs.		616'1	639'6	664'8	687'7	709'2	729'5	748'6	767'4	785'9	804'4
Breaking-weight per sup. foot	in lbs.	186'9	184'7	182'7	180'8	178'9	177'2	175'5	173'9	172'4	170'9	
Weight distributed	in lbs.	4410	4620	4830	5040	5250	5460	5670	5880	6090	6300	
Breaking-weight distributed	...	8243	8535	8825	9111	9394	9675	9953	10220	10500	10770	
Depth of beam	in inches	22'	11'93	12'07	12'20	12'34	12'46	12'58	12'71	12'82	12'93	13'06
Breadth of beam	in inches		8'437	8'536	8'631	8'723	8'813	8'900	8'984	9'066	9'146	9'224
Sectional area	in sup. feet		6991	7155	7316	7474	7629	7779	7927	8073	8216	8357
Contents	in cubic feet		15'38	15'74	16'09	16'44	16'78	17'11	17'44	17'76	18'08	18'38
Weight	in lbs.		692'1	708'4	724'3	739'9	755'1	770'1	784'8	799'2	813'3	827'2
Breaking-weight per sup. foot	in lbs.	189'1	186'9	184'8	182'9	181'0	179'2	177'5	175'9	174'4	172'9	
Weight distributed	in lbs.	4620	4840	5060	5280	5500	5720	5940	6160	6380	6600	
Breaking-weight distributed	...	8735	9046	9353	9657	9957	10250	10550	10840	11130	11410	
Depth of beam	in inches	23'	12'34	12'48	12'59	12'75	12'89	13'01	13'14	13'26	13'37	13'49
Breadth of beam	in inches		8'723	8'825	8'924	9'019	9'112	9'201	9'299	9'373	9'456	9'537
Sectional area	in sup. feet		7473	7649	7821	7989	8154	8315	8474	8629	8782	8932
Contents	in cubic feet		17'18	17'59	17'98	18'37	18'75	19'12	19'49	19'84	20'19	20'54
Weight	in lbs.		773'4	791'6	809'4	826'8	843'9	860'6	876'0	891'3	906'9	922'4
Breaking-weight per sup. foot	in lbs.	191'2	189'0	186'9	185'0	183'0	181'2	179'5	177'9	176'3	174'9	
Weight distributed	in lbs.	4830	5060	5290	5520	5750	5980	6210	6440	6670	6900	
Breaking-weight distributed	...	9235	9563	9888	10200	10520	10840	11150	11460	11760	12060	
Depth of beam	in inches	24'	12'74	12'89	13'03	13'17	13'30	13'44	13'57	13'69	13'74	13'92
Breadth of beam	in inches		9'005	9'111	9'213	9'312	9'407	9'500	9'590	9'678	9'763	9'846
Sectional area	in sup. feet		7965	8153	8336	8515	8691	8863	9032	9198	9361	9521
Contents	in cubic feet		19'11	19'56	20'00	20'43	20'85	21'27	21'68	22'07	22'46	22'85
Weight	in lbs.		869'2	889'5	909'3	919'6	938'6	957'2	975'4	993'3	1010	1029
Breaking-weight per sup. foot	in lbs.	193'2	191'0	188'9	186'9	185'0	183'2	181'4	179'8	178'3	176'7	
Weight distributed	in lbs.	5040	5280	5520	5760	6000	6240	6480	6720	6960	7200	
Breaking-weight distributed	...	9740	10080	10430	10770	11100	11430	11760	12080	12400	12720	
Depth of beam	in inches	25'	13'13	13'29	13'43	13'58	13'72	13'85	13'98	14'11	14'24	14'36
Breadth of beam	in inches		9'286	9'394	9'500	9'601	9'700	9'795	9'888	9'978	10'06	10'15
Sectional area	in sup. feet		8467	8666	8861	9052	9238	9421	9601	9777	9950	1'012
Contents	in cubic feet		21'47	21'67	21'85	22'03	22'19	22'36	22'50	22'64	22'88	23'01
Weight	in lbs.		952'7	973'1	993'1	1013	1033	1050	1068	1080	1100	1138
Breaking-weight per sup. foot	in lbs.	195'2	192'3	190'8	188'8	186'9	185'0	183'3	181'6	180'1	178'5	
Weight distributed	in lbs.	5250	5500	5750	6000	6250	6500	6750	7000	7250	7500	
Breaking-weight distributed	...	10250	10610	10970	11330	11680	12030	12370	12720	13050	13390	
Depth of beam	in inches	26'	13'53	13'68	13'84	13'98	14'13	14'27	14'40	14'53	14'66	14'79
Breadth of beam	in inches		9'563	9'675	9'783	9'888	9'989	10'08	10'18	10'27	10'36	10'45
Sectional area	in sup. feet		9107	9321	9531	9736	9937	1'013	1'032	1'051	1'070	1'088
Contents	in cubic feet		23'35	23'90	24'44	24'96	25'48	25'98	26'48	26'96	27'44	27'91
Weight	in lbs.		1051	1075	1100	1123	1146	1169	1192	1214	1235	1257
Breaking-weight per sup. foot	in lbs.	197'1	194'8	192'7	190'6	188'7	186'9	185'1	183'4	181'8	180'4	
Weight distributed	in lbs.	5460	5720	5980	6240	6500	6760	7020	7280	7540	7800	
Breaking-weight distributed	...	10770	11150	11520	11900	12270	12630	12990	13350	13710	14090	
Depth of beam	in inches	27'	13'91	14'08	14'23	14'38	14'53	14'67	14'82	14'95	15'08	15'21
Breadth of beam	in inches		9'838	9'953	10'06	10'17	10'27	10'38	10'48	10'57	10'66	10'75
Sectional area	in sup. feet		9505	9729	9947	1'016	1'037	1'057	1'077	1'097	1'117	1'136
Contents	in cubic feet		25'06	25'26	25'86	26'43	26'90	27'43	27'90	28'35	28'81	29'26
Weight	in lbs.		1154	1182	1208	1234	1260	1285	1310	1334	1360	1380
Breaking-weight per sup. foot	in lbs.	199'0	196'7	194'6	192'5	190'6	188'6	186'9	185'2	183'6	182'0	
Weight distributed	in lbs.	5670	5940	6210	6480	6750	7020	7290	7560	7830	8100	
Breaking-weight distributed	...	11280	11680	12080	12480	12880	13250	13620	14000	14370	14740	
Depth of beam	in inches	28'	14'30	14'47	14'63	14'78	14'94	14'98	15'23	15'36	15'50	15'63
Breadth of beam	in inches		10'11	10'22	10'34	10'45	10'56	10'66	10'77	10'87	10'96	11'05
Sectional area	in sup. feet		1'003	1'027	1'050	1'073	1'095	1'117	1'138	1'159	1'179	1'200
Contents	in cubic feet		28'10	28'77	29'41	30'04	30'66	31'27	31'87	32'45	33'03	33'59
Weight	in lbs.		1265	1295	1323	1353	1379	1407	1434	1460	1486	1511
Breaking-weight per sup. foot	in lbs.	200'8	198'5	196'4	194'2	192'2	190'4	188'6	186'9	185'2	183'7	
Weight distributed	in lbs.	5880	6160	6440	6720	7000	7280	7560	7840	8120	8400	
Breaking-weight distributed	...	11810	12220	12640	13050	13460	13860	14260	14650	15040	15430	
Depth of beam	in inches	29'	14'68	14'85	15'02	15'18	15'33	15'48	15'63	15'77	15'91	16'05
Breadth of beam	in inches		10'38	10'50	10'62	10'73	10'84	10'95	11'05	11'15	11'25	11'34
Sectional area	in sup. feet		1'058	1'083	1'107	1'131	1'154	1'177	1'200	1'222	1'243	1'264
Contents	in cubic feet		30'68	31'41	32'11	32'80	33'48	34'16	34'79	35'43	36'06	36'67
Weight	in lbs.		1381	1413	1445	1476	1506	1536	1565	1594	1622	1650
Breaking-weight per sup. foot	in lbs.	202'6	200'2	197'9	195'9	193'9	191'9	189'2	186'5	183'9	181'3	
Weight distributed	in lbs.	6090	6390	6670	6960	7250	7540	7830	8120	8410	8700	
Breaking-weight distributed	...	12340	12770	13210	13640	14070	14480	14900	15320	15720	16120	
Depth of beam	in inches	30'	15'06	15'23	15'40	15'57	15'72	15'88	16'03	16'18	16'32	16'46
Breadth of beam	in inches		10'65	10'77	10'89	11'00	11'12	11'23	11'33	11'44	11'54	11'64
Sectional area	in sup. feet		1'113	1'139	1'165	1'190	1'214	1'238	1'262	1'286	1'308	1'331
Contents	in cubic feet		33'39	34'18	34'95	35'70	36'44	37'16	37'87	38'56	39'25	39'92
Weight	in lbs.		1502	1539	1572	1606	1639	1672	1704	1735	1767	1798
Breaking-weight per sup. foot	in lbs.	204'3	201'9	199'7	197'6	195'6	193'7	191'9	189'0	186'0	183'0	
Weight distributed	in lbs.	6300	6600	6900	7200	7500	7800	8100	8400	8700	9000	
Breaking-weight distributed	...	12870	13390	13790	14230	14670	15100	15540	15970	16400	16820	

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = 800$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		31	32	33	34	35	36	37	38	39	40
Depth of beam in inches	21	12.70	12.80	12.90	12.99	13.10	13.19	13.28	13.36	13.45	13.53
Breadth of beam in inches		8.981	9.053	9.122	9.191	9.257	9.323	9.387	9.450	9.511	9.572
Sectional area in sup. feet		7922	8049	8173	8296	8417	8536	8654	8771	8885	8998
Contents in cubic feet		16.64	16.90	17.16	17.42	17.67	17.92	18.17	18.41	18.66	18.89
Weight in lbs.		748.6	760.6	772.4	784.0	795.2	806.7	817.8	828.8	839.6	850.3
Breaking-weight per sup. foot in lbs.	22	169.5	168.2	166.9	165.7	164.5	163.4	162.2	161.1	160.1	159.1
Weight distributed in lbs.		6510	6720	6930	7140	7350	7560	7770	7980	8190	8400
Breaking-weight distributed		11040	11300	11570	11840	12090	12350	12600	12850	13110	13360
Depth of beam in inches	23	13.15	13.26	13.36	13.46	13.56	13.65	13.75	13.84	13.93	14.01
Breadth of beam in inches		9.300	9.374	9.446	9.517	9.586	9.654	9.720	9.785	9.849	9.912
Sectional area in sup. feet		8494	8630	8764	8896	9025	9153	9280	9404	9527	9649
Contents in cubic feet		18.68	18.98	19.28	19.57	19.85	20.14	20.41	20.69	20.96	21.22
Weight in lbs.		840.9	854.4	867.6	880.7	893.5	906.2	918.7	931.0	943.2	955.2
Breaking-weight per sup. foot in lbs.	24	171.5	170.2	168.9	167.6	166.4	165.2	164.1	163.0	161.9	160.9
Weight distributed in lbs.		6820	7040	7260	7480	7700	7920	8140	8360	8580	8800
Breaking-weight distributed		11700	11990	12280	12540	12810	13080	13360	13630	13890	14160
Depth of beam in inches	25	13.60	13.71	13.81	13.92	14.02	14.11	14.21	14.31	14.40	14.49
Breadth of beam in inches		9.615	9.692	9.767	9.841	9.911	9.981	10.05	10.12	10.18	10.24
Sectional area in sup. feet		9080	9225	9368	9509	9647	9784	9920	1005	1018	1031
Contents in cubic feet		20.88	21.21	21.54	21.87	22.19	22.50	22.81	23.13	23.42	23.72
Weight in lbs.		939.8	954.8	969.6	984.1	998.5	1012	1026	1040	1054	1067
Breaking-weight per sup. foot in lbs.	26	173.4	172.1	171.1	169.5	168.3	167.2	166.0	164.9	163.8	162.7
Weight distributed in lbs.		7130	7360	7590	7820	8050	8280	8510	8740	8970	9200
Breaking-weight distributed		12360	12660	12960	13250	13540	13840	14120	14400	14690	14970
Depth of beam in inches	27	14.04	14.15	14.26	14.37	14.47	14.57	14.67	14.77	14.87	14.97
Breadth of beam in inches		9.927	10.00	10.08	10.16	10.24	10.31	10.38	10.44	10.51	10.58
Sectional area in sup. feet		9678	9833	9986	1013	1029	1043	1057	1072	1085	1100
Contents in cubic feet		22.33	22.69	23.06	23.43	23.79	24.15	24.50	24.85	25.20	25.55
Weight in lbs.		1045	1062	1078	1094	1110	1126	1141	1157	1173	1187
Breaking-weight per sup. foot in lbs.	28	175.3	173.9	172.6	171.3	170.1	168.9	167.7	166.6	165.5	164.5
Weight distributed in lbs.		7440	7680	7920	8160	8400	8640	8880	9120	9360	9600
Breaking-weight distributed		13040	13360	13670	13980	14280	14590	14900	15190	15490	15790
Depth of beam in inches	29	14.47	14.59	14.70	14.81	14.92	15.03	15.13	15.23	15.33	15.42
Breadth of beam in inches		10.24	10.31	10.39	10.48	10.55	10.63	10.70	10.77	10.84	10.91
Sectional area in sup. feet		1023	1045	1061	1077	1093	1108	1123	1139	1154	1168
Contents in cubic feet		25.72	26.13	26.54	26.94	27.33	27.72	28.10	28.48	28.85	29.22
Weight in lbs.		1157	1176	1194	1212	1230	1248	1264	1281	1298	1314
Breaking-weight per sup. foot in lbs.	30	177.1	175.7	174.3	172.8	171.3	169.8	168.3	166.8	165.3	164.2
Weight distributed in lbs.		7750	8000	8250	8500	8750	9000	9250	9500	9750	10000
Breaking-weight distributed		13720	14060	14390	14710	15040	15350	15670	15990	16300	16620
Depth of beam in inches	31	14.91	15.02	15.14	15.26	15.37	15.48	15.58	15.68	15.79	15.89
Breadth of beam in inches		10.54	10.62	10.70	10.78	10.87	10.94	11.02	11.10	11.16	11.23
Sectional area in sup. feet		1106	1124	1141	1159	1175	1192	1208	1225	1241	1257
Contents in cubic feet		28.37	28.83	29.27	29.72	30.15	30.57	31.00	31.41	31.82	32.23
Weight in lbs.		1277	1298	1317	1337	1356	1375	1395	1413	1433	1450
Breaking-weight per sup. foot in lbs.	32	178.8	177.5	176.1	174.7	173.3	171.8	170.3	168.8	167.3	165.8
Weight distributed in lbs.		8060	8320	8580	8840	9100	9360	9620	9880	10140	10400
Breaking-weight distributed		14410	14760	15110	15450	15790	16120	16460	16790	17120	17450
Depth of beam in inches	33	15.33	15.46	15.58	15.69	15.81	15.92	16.03	16.14	16.24	16.34
Breadth of beam in inches		10.84	10.93	11.01	11.10	11.17	11.25	11.33	11.41	11.49	11.55
Sectional area in sup. feet		1154	1173	1192	1209	1227	1245	1261	1278	1295	1311
Contents in cubic feet		31.18	31.68	32.17	32.65	33.13	33.60	34.06	34.52	34.97	35.42
Weight in lbs.		1403	1426	1447	1469	1490	1512	1533	1553	1573	1593
Breaking-weight per sup. foot in lbs.	34	180.5	179.4	177.7	176.4	175.1	173.7	172.3	170.9	169.5	168.0
Weight distributed in lbs.		8370	8640	8910	9180	9450	9720	10000	10280	10560	10840
Breaking-weight distributed		15110	15470	15840	16190	16550	16910	17260	17600	17950	18290
Depth of beam in inches	35	15.76	15.89	16.01	16.13	16.25	16.36	16.47	16.58	16.69	16.79
Breadth of beam in inches		11.15	11.23	11.32	11.41	11.49	11.57	11.65	11.73	11.80	11.87
Sectional area in sup. feet		1219	1239	1258	1277	1295	1314	1332	1350	1368	1385
Contents in cubic feet		34.15	34.69	35.23	35.76	36.28	36.80	37.31	37.81	38.30	38.79
Weight in lbs.		1536	1561	1585	1609	1632	1656	1679	1701	1723	1745
Breaking-weight per sup. foot in lbs.	36	182.2	180.8	179.3	177.8	176.3	174.8	173.3	171.8	170.3	168.8
Weight distributed in lbs.		8680	8960	9240	9520	9800	10080	10360	10640	10920	11200
Breaking-weight distributed		15820	16190	16570	16950	17320	17690	18060	18420	18780	19150
Depth of beam in inches	37	16.18	16.31	16.43	16.56	16.68	16.80	16.91	17.03	17.13	17.24
Breadth of beam in inches		11.44	11.53	11.62	11.70	11.79	11.87	11.95	12.03	12.11	12.19
Sectional area in sup. feet		1283	1307	1326	1346	1366	1385	1404	1423	1441	1460
Contents in cubic feet		37.28	37.88	38.46	39.04	39.61	40.17	40.73	41.27	41.81	42.35
Weight in lbs.		1677	1704	1730	1757	1783	1808	1833	1857	1881	1905
Breaking-weight per sup. foot in lbs.	38	183.8	182.3	180.9	179.6	178.3	177.1	175.8	174.5	173.2	171.9
Weight distributed in lbs.		8900	9200	9500	9800	10100	10400	10700	11000	11300	11600
Breaking-weight distributed		16520	16920	17320	17710	18100	18480	18870	19250	19630	20000
Depth of beam in inches	39	16.60	16.73	16.86	16.99	17.11	17.23	17.35	17.46	17.58	17.68
Breadth of beam in inches		11.73	11.83	11.92	12.01	12.09	12.18	12.26	12.34	12.43	12.51
Sectional area in sup. feet		1353	1375	1395	1416	1437	1457	1477	1497	1518	1536
Contents in cubic feet		40.58	41.23	41.86	42.49	43.11	43.73	44.33	44.92	45.51	46.09
Weight in lbs.		1826	1855	1884	1912	1940	1967	1994	2021	2048	2074
Breaking-weight per sup. foot in lbs.	40	184.4	183.0	181.5	180.0	178.5	177.0	175.5	174.0	172.5	171.0
Weight distributed in lbs.		9300	9600	9900	10200	10500	10800	11100	11400	11700	12000
Breaking-weight distributed		17240	17650	18070	18470	18880	19280	19690	20090	20480	20870

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = 800$$

$$\frac{a}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			41	42	43	44	45	46	47	48	49	50
Depth of beam	in inches	21	13.62	13.70	13.78	13.86	13.94	14.01	14.10	14.16	14.24	14.31
Breadth of beam	in inches		9.631	9.689	9.746	9.803	9.858	9.912	9.966	10.01	10.07	10.12
Sectional area	in sup. feet		9110	9221	9330	9438	9544	9650	9754	9857	9960	1006
Contents	in cubic feet		19.13	19.37	19.59	19.82	20.04	20.26	20.48	20.71	20.91	21.12
Weight	in lbs.		860.9	871.3	881.6	891.8	901.9	911.9	921.7	931.5	941.2	950.7
Breaking-weight per sup. foot	in lbs.	158.2	157.1	156.2	155.3	154.4	153.6	152.8	152.0	151.2	150.4	
Weight distributed	in lbs.	8610	8820	9030	9240	9450	9660	9870	10080	10290	10500	
Breaking-weight distributed	...	13620	13864	14110	14360	14600	14843	15081	15323	15560	15800	
Depth of beam	in inches	22	14.10	14.19	14.27	14.36	14.43	14.51	14.59	14.67	14.74	14.82
Breadth of beam	in inches		9.973	10.03	10.10	10.15	10.20	10.26	10.32	10.37	10.43	10.48
Sectional area	in sup. feet		9768	9887	10000	10112	10224	10336	10448	10560	10672	10784
Contents	in cubic feet		21.49	21.75	22.00	22.26	22.51	22.76	23.01	23.25	23.49	23.73
Weight	in lbs.		967.0	978.8	990.3	1001.3	1013	1024	1036	1046	1057	1068
Breaking-weight per sup. foot	in lbs.	160.0	159.0	158.0	157.1	156.3	155.4	154.6	153.7	152.8	152.2	
Weight distributed	in lbs.	9020	9240	9460	9680	9900	10120	10340	10560	10780	11000	
Breaking-weight distributed	...	14430	14693	14954	15215	15472	15732	15985	16243	16495	16746	
Depth of beam	in inches	23	14.58	14.67	14.75	14.83	14.92	15.00	15.08	15.16	15.25	15.32
Breadth of beam	in inches		10.31	10.37	10.43	10.49	10.55	10.61	10.67	10.72	10.78	10.83
Sectional area	in sup. feet		1044	1057	1070	1082	1094	1106	1118	1130	1141	1153
Contents	in cubic feet		24.01	24.30	24.59	24.88	25.16	25.44	25.71	25.98	26.25	26.52
Weight	in lbs.		1080	1093	1107	1120	1132	1144	1157	1169	1181	1193
Breaking-weight per sup. foot	in lbs.	161.7	160.8	159.8	158.9	158.0	157.1	156.4	155.5	154.7	153.9	
Weight distributed	in lbs.	9430	9650	9880	10130	10350	10580	10810	11040	11270	11500	
Breaking-weight distributed	...	15254	15533	15808	16080	16350	16620	16890	17160	17430	17710	
Depth of beam	in inches	24	15.05	15.14	15.23	15.32	15.41	15.49	15.57	15.66	15.74	15.82
Breadth of beam	in inches		10.65	10.71	10.77	10.83	10.89	10.95	11.02	11.07	11.13	11.18
Sectional area	in sup. feet		1113	1126	1139	1153	1166	1179	1192	1204	1217	1229
Contents	in cubic feet		26.71	27.03	27.36	27.67	27.98	28.29	28.60	28.90	29.20	29.50
Weight	in lbs.		1202	1217	1231	1245	1259	1273	1287	1301	1314	1328
Breaking-weight per sup. foot	in lbs.	163.5	162.5	161.5	160.6	159.7	158.9	157.6	157.1	156.4	155.5	
Weight distributed	in lbs.	9840	10080	10320	10560	10800	11040	11280	11520	11760	12000	
Breaking-weight distributed	...	16088	16382	16672	16960	17251	17538	17822	18107	18390	18670	
Depth of beam	in inches	25	15.52	15.61	15.71	15.80	15.89	15.97	16.06	16.15	16.23	16.31
Breadth of beam	in inches		10.97	11.05	11.11	11.17	11.23	11.29	11.36	11.41	11.47	11.54
Sectional area	in sup. feet		1184	1197	1211	1225	1239	1254	1266	1280	1293	1307
Contents	in cubic feet		29.59	29.94	30.29	30.64	30.99	31.34	31.67	32.01	32.34	32.67
Weight	in lbs.		1331	1347	1363	1379	1394	1410	1425	1440	1455	1470
Breaking-weight per sup. foot	in lbs.	165.1	164.1	163.2	162.2	161.3	160.4	159.6	158.7	157.9	157.1	
Weight distributed	in lbs.	10250	10500	10750	11000	11250	11500	11750	12000	12250	12500	
Breaking-weight distributed	...	16932	17240	17546	17851	18197	18460	18750	19000	19353	19647	
Depth of beam	in inches	26	15.98	16.08	16.17	16.27	16.36	16.45	16.54	16.63	16.72	16.80
Breadth of beam	in inches		11.30	11.37	11.44	11.50	11.57	11.63	11.70	11.75	11.82	11.88
Sectional area	in sup. feet		1272	1288	1304	1319	1333	1348	1362	1376	1391	1405
Contents	in cubic feet		32.63	33.03	33.42	33.81	34.18	34.56	34.94	35.31	35.67	36.03
Weight	in lbs.		1468	1486	1504	1521	1539	1555	1572	1589	1604	1621
Breaking-weight per sup. foot	in lbs.	168.8	168.8	167.9	166.8	165.0	162.0	161.2	160.4	159.5	158.7	
Weight distributed	in lbs.	10660	10920	11180	11440	11700	11960	12220	12480	12740	13000	
Breaking-weight distributed	...	17782	18106	18425	18748	19068	19384	19699	20013	20333	20635	
Depth of beam	in inches	27	16.45	16.54	16.64	16.74	16.83	16.92	17.01	17.11	17.19	17.28
Breadth of beam	in inches		11.63	11.70	11.76	11.84	11.90	11.97	12.03	12.09	12.16	12.22
Sectional area	in sup. feet		1328	1344	1362	1375	1391	1407	1422	1437	1452	1466
Contents	in cubic feet		35.86	36.29	36.72	37.15	37.57	37.96	38.39	38.80	39.20	39.60
Weight	in lbs.		1613	1634	1654	1672	1691	1709	1727	1746	1764	1782
Breaking-weight per sup. foot	in lbs.	168.3	167.3	166.4	165.4	164.5	163.6	162.7	161.9	161.0	160.2	
Weight distributed	in lbs.	11070	11340	11610	11880	12150	12420	12690	12960	13230	13500	
Breaking-weight distributed	...	18640	18950	19316	19654	19987	20320	20650	20977	21305	21632	
Depth of beam	in inches	28	16.90	17.00	17.11	17.21	17.30	17.39	17.48	17.58	17.67	17.76
Breadth of beam	in inches		11.95	12.03	12.09	12.17	12.23	12.30	12.36	12.43	12.49	12.55
Sectional area	in sup. feet		1402	1420	1438	1453	1469	1485	1501	1518	1533	1549
Contents	in cubic feet		39.27	39.75	40.22	40.68	41.14	41.60	42.05	42.49	42.93	43.37
Weight	in lbs.		1767	1788	1809	1830	1851	1872	1892	1912	1932	1951
Breaking-weight per sup. foot	in lbs.	169.9	168.9	167.9	166.9	166.0	165.1	164.2	163.4	162.5	161.6	
Weight distributed	in lbs.	11480	11760	12040	12320	12600	12880	13160	13440	13720	14000	
Breaking-weight distributed	...	19507	19870	20216	20568	20918	21265	21611	21955	22298	22638	
Depth of beam	in inches	29	17.35	17.45	17.56	17.67	17.76	17.85	17.95	18.04	18.14	18.23
Breadth of beam	in inches		12.37	12.34	12.42	12.48	12.55	12.62	12.69	12.76	12.83	12.89
Sectional area	in sup. feet		1478	1497	1514	1532	1549	1566	1582	1599	1616	1632
Contents	in cubic feet		42.57	43.39	43.90	44.41	44.92	45.41	45.90	46.39	46.87	47.34
Weight	in lbs.		1929	1952	1975	1998	2021	2043	2066	2087	2109	2130
Breaking-weight per sup. foot	in lbs.	171.4	170.3	169.4	168.4	167.4	166.5	165.6	164.7	163.9	163.1	
Weight distributed	in lbs.	11890	12180	12470	12760	13050	13340	13630	13920	14210	14500	
Breaking-weight distributed	...	20883	20754	21124	21490	21855	22220	22580	22940	23297	23653	
Depth of beam	in inches	30	17.79	17.91	18.01	18.12	18.21	18.31	18.41	18.51	18.61	18.70
Breadth of beam	in inches		12.58	12.66	12.74	12.81	12.88	12.95	13.02	13.09	13.16	13.22
Sectional area	in sup. feet		1555	1574	1593	1611	1630	1647	1665	1683	1700	1717
Contents	in cubic feet		46.87	47.23	47.79	48.34	48.89	49.44	49.96	50.49	51.01	51.53
Weight	in lbs.		2100	2125	2150	2175	2200	2224	2248	2272	2295	2319
Breaking-weight per sup. foot	in lbs.	172.8	171.8	170.8	169.8	168.9	167.9	167.0	166.2	165.3	164.5	
Weight distributed	in lbs.	12300	12600	12900	13200	13500	13800	14100	14400	14700	15000	
Breaking-weight distributed	...	21264	21652	22037	22420	22801	23181	23560	23932	24306	24670	

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		5'1	5'2	5'3	5'4	5'5	5'6	5'7	5'8	5'9	6'0
Depth of beam in inches	21'	14'38	14'46	14'53	14'59	14'66	14'73	14'79	14'85	14'91	14'98
Breadth of beam in inches		10'17	10'22	10'27	10'31	10'36	10'41	10'45	10'50	10'55	10'60
Sectional area in sup. feet		1'016	1'026	1'036	1'045	1'055	1'065	1'074	1'083	1'092	1'102
Contents in cubic feet		21'34	21'54	21'75	21'95	22'16	22'36	22'56	22'76	22'95	23'14
Weight in lbs.		960'2	969'5	978'8	987'9	997'1	1006	1015	1024	1033	1041
Breaking-weight per sup. foot in lbs.	22'	149'7	149'0	148'3	147'6	146'9	146'2	145'5	144'8	144'1	143'4
Weight distributed in lbs.		107'10	109'20	111'30	113'40	115'50	117'60	119'70	121'80	123'90	126'00
Breaking-weight distributed in lbs.		1604'0	1627'0	1650'0	1673'0	1697'0	1720'0	1743'0	1765'0	1788'0	1812'0
Depth of beam in inches		14'90	14'97	15'04	15'11	15'18	15'25	15'32	15'39	15'44	15'51
Breadth of beam in inches		10'53	10'58	10'63	10'68	10'73	10'78	10'83	10'87	10'92	10'97
Sectional area in sup. feet	23'	1'089	1'100	1'110	1'121	1'131	1'141	1'151	1'162	1'171	1'181
Contents in cubic feet		26'78	27'04	27'30	27'56	27'81	28'07	28'32	28'56	28'81	29'05
Weight in lbs.		1078	1089	1100	1110	1120	1130	1140	1150	1160	1170
Breaking-weight per sup. foot in lbs.		151'4	150'7	150'0	149'3	148'6	147'9	147'2	146'5	145'8	145'1
Weight distributed in lbs.		112'20	114'40	116'60	118'80	121'00	123'20	125'40	127'60	129'80	132'00
Breaking-weight distributed in lbs.		1690'0	1724'0	1749'0	1774'0	1798'0	1823'0	1847'0	1871'0	1895'0	1920'0
Depth of beam in inches	24'	15'40	15'47	15'54	15'61	15'68	15'75	15'82	15'89	15'96	16'04
Breadth of beam in inches		10'89	10'94	11'00	11'05	11'10	11'15	11'20	11'24	11'29	11'34
Sectional area in sup. feet		1'165	1'176	1'187	1'198	1'209	1'220	1'231	1'242	1'252	1'263
Contents in cubic feet		28'78	29'04	29'30	29'56	30'21	30'46	31'21	31'46	31'71	31'96
Weight in lbs.		1206	1217	1228	1238	1249	1259	1269	1279	1289	1299
Breaking-weight per sup. foot in lbs.	25'	153'2	152'5	151'8	151'1	150'4	149'7	149'0	148'3	147'6	146'9
Weight distributed in lbs.		117'30	119'60	121'90	124'20	126'50	128'80	131'10	133'40	135'70	138'00
Breaking-weight distributed in lbs.		1796'0	1823'0	1850'0	1877'0	1904'0	1931'0	1958'0	1985'0	2012'0	2039'0
Depth of beam in inches		15'90	15'97	16'05	16'12	16'20	16'27	16'34	16'42	16'49	16'56
Breadth of beam in inches		11'24	11'30	11'36	11'41	11'46	11'51	11'56	11'61	11'66	11'71
Sectional area in sup. feet	26'	1'241	1'254	1'267	1'277	1'289	1'301	1'313	1'323	1'335	1'346
Contents in cubic feet		29'79	30'08	30'37	30'65	30'94	31'21	31'49	31'77	32'04	32'31
Weight in lbs.		1340	1353	1366	1379	1392	1404	1417	1429	1443	1454
Breaking-weight per sup. foot in lbs.		154'8	154'0	153'3	152'6	151'9	151'2	150'5	149'8	149'1	148'4
Weight distributed in lbs.		122'40	124'80	127'20	129'60	132'00	134'40	136'80	139'20	141'60	144'00
Breaking-weight distributed in lbs.		1894'0	1922'0	1950'0	1978'0	2005'0	2033'0	2060'0	2088'0	2115'0	2143'0
Depth of beam in inches	27'	16'39	16'47	16'55	16'63	16'70	16'78	16'85	16'93	17'00	17'07
Breadth of beam in inches		11'59	11'65	11'70	11'76	11'81	11'86	11'92	11'97	12'03	12'07
Sectional area in sup. feet		1'319	1'332	1'345	1'357	1'369	1'382	1'395	1'407	1'420	1'431
Contents in cubic feet		32'99	33'31	33'63	33'95	34'26	34'57	34'88	35'18	35'49	35'79
Weight in lbs.		1484	1499	1514	1528	1542	1555	1569	1582	1595	1608
Breaking-weight per sup. foot in lbs.	28'	156'4	155'6	154'9	154'2	153'5	152'8	152'1	151'4	150'7	150'0
Weight distributed in lbs.		127'50	130'00	132'50	135'00	137'50	140'00	142'50	145'00	147'50	150'00
Breaking-weight distributed in lbs.		1994'0	2029'0	2064'0	2099'0	2134'0	2169'0	2204'0	2239'0	2274'0	2309'0
Depth of beam in inches		16'88	16'96	17'04	17'12	17'20	17'28	17'36	17'43	17'51	17'58
Breadth of beam in inches		11'93	12'00	12'06	12'11	12'17	12'22	12'28	12'32	12'38	12'43
Sectional area in sup. feet	29'	1'420	1'433	1'447	1'460	1'473	1'487	1'500	1'514	1'526	1'539
Contents in cubic feet		36'40	36'75	37'10	37'45	37'79	38'13	38'47	38'81	39'14	39'47
Weight in lbs.		1637	1653	1669	1685	1700	1716	1731	1746	1761	1776
Breaking-weight per sup. foot in lbs.		157'9	157'1	156'4	155'7	154'9	154'2	153'5	152'8	152'1	151'4
Weight distributed in lbs.		132'60	135'20	137'80	140'40	143'00	145'60	148'20	150'80	153'40	156'00
Breaking-weight distributed in lbs.		2050'0	2085'0	2120'0	2155'0	2190'0	2225'0	2260'0	2295'0	2330'0	2365'0
Depth of beam in inches	30'	17'36	17'45	17'53	17'61	17'70	17'77	17'85	17'93	18'01	18'08
Breadth of beam in inches		12'28	12'34	12'40	12'45	12'51	12'57	12'62	12'68	12'74	12'79
Sectional area in sup. feet		1'481	1'495	1'511	1'525	1'539	1'552	1'566	1'579	1'593	1'606
Contents in cubic feet		40'00	40'38	40'77	41'15	41'53	41'91	42'28	42'65	43'01	43'38
Weight in lbs.		1799	1817	1834	1852	1869	1887	1904	1921	1938	1955
Breaking-weight per sup. foot in lbs.	31'	159'4	158'6	157'9	157'1	156'4	155'7	154'9	154'2	153'5	152'8
Weight distributed in lbs.		137'0	140'0	143'0	146'0	149'0	152'0	155'0	158'0	161'0	164'0
Breaking-weight distributed in lbs.		2150'0	2190'0	2230'0	2270'0	2310'0	2350'0	2390'0	2430'0	2470'0	2510'0
Depth of beam in inches		17'84	17'93	18'02	18'10	18'18	18'27	18'35	18'43	18'51	18'58
Breadth of beam in inches		12'62	12'68	12'74	12'80	12'86	12'92	12'98	13'04	13'09	13'14
Sectional area in sup. feet	32'	1'564	1'579	1'594	1'609	1'624	1'639	1'653	1'668	1'682	1'696
Contents in cubic feet		43'80	44'23	44'65	45'07	45'49	45'90	46'31	46'71	47'11	47'51
Weight in lbs.		1971	1990	2009	2028	2047	2066	2085	2104	2123	2142
Breaking-weight per sup. foot in lbs.		160'9	160'1	159'3	158'6	157'8	157'1	156'4	155'7	155'0	154'3
Weight distributed in lbs.		14280	14560	14840	15120	15400	15680	15960	16240	16520	16800
Breaking-weight distributed in lbs.		2270'0	2310'0	2350'0	2390'0	2430'0	2470'0	2510'0	2550'0	2590'0	2630'0
Depth of beam in inches	33'	18'33	18'41	18'50	18'58	18'67	18'75	18'84	18'93	19'00	19'08
Breadth of beam in inches		12'95	13'02	13'08	13'14	13'20	13'26	13'32	13'38	13'43	13'49
Sectional area in sup. feet		1'640	1'655	1'671	1'686	1'701	1'717	1'732	1'747	1'762	1'777
Contents in cubic feet		47'82	48'28	48'75	49'21	49'66	50'10	50'55	50'99	51'43	51'87
Weight in lbs.		2151	2170	2189	2208	2227	2246	2265	2284	2303	2322
Breaking-weight per sup. foot in lbs.	34'	162'3	161'5	160'7	160'0	159'3	158'5	157'8	157'1	156'4	155'8
Weight distributed in lbs.		14790	15080	15370	15660	15950	16240	16530	16820	17110	17400
Breaking-weight distributed in lbs.		2400'0	2435'0	2470'0	2505'0	2540'0	2575'0	2610'0	2645'0	2680'0	2715'0
Depth of beam in inches		18'80	18'88	18'97	19'06	19'15	19'24	19'33	19'42	19'51	19'57
Breadth of beam in inches		13'29	13'35	13'42	13'48	13'54	13'60	13'66	13'72	13'78	13'84
Sectional area in sup. feet	35'	1'733	1'751	1'768	1'785	1'802	1'819	1'836	1'853	1'870	1'887
Contents in cubic feet		52'04	52'55	53'06	53'55	54'05	54'54	55'02	55'50	56'38	57'26
Weight in lbs.		2342	2365	2387	2410	2433	2455	2478	2500	2523	2545
Breaking-weight per sup. foot in lbs.		163'7	162'9	162'1	161'3	160'6	159'8	159'1	158'3	157'6	156'9
Weight distributed in lbs.		15300	15600	15900	16200	16500	16800	17100	17400	17700	18000
Breaking-weight distributed in lbs.		2504'0	2540'0	2576'0	2612'0	2648'0	2684'0	2720'0	2756'0	2792'0	2828'0

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.										
			6'1	6'2	6'3	6'4	6'5	6'6	6'7	6'8	6'9	7'0	
Depth of beam	in inches	21'	15'04	15'11	15'16	15'22	15'28	15'34	15'40	15'46	15'51	15'57	
Breadth of beam	in inches		10'63	10'68	10'72	10'77	10'80	10'84	10'89	10'93	10'97	11'01	
Sectional area	in sup. feet		1'111	1'120	1'129	1'138	1'147	1'155	1'165	1'173	1'181	1'190	
Contents	in cubic feet		23'34	23'52	23'72	23'90	24'09	24'27	24'45	24'63	24'82	24'99	
Weight	in lbs.		1050	1058	1067	1075	1084	1092	1100	1108	1117	1125	
Breaking-weight per sup. foot	in lbs.	22'	143'1	142'6	142'0	141'4	140'9	140'3	139'8	139'4	138'8	138'3	
Weight distributed	in lbs.		12810	13020	13230	13440	13650	13860	14070	14280	14490	14700	
Breaking-weight distributed	...		18940	18567	18790	19020	19240	19460	19678	19897	20117	20335	
Depth of beam	in inches		15'57	15'64	15'70	15'76	15'82	15'89	15'95	16'00	16'06	16'12	
Breadth of beam	in inches		11'01	11'06	11'10	11'15	11'19	11'23	11'28	11'31	11'36	11'40	
Sectional area	in sup. feet	23'	1'192	1'201	1'211	1'220	1'230	1'239	1'248	1'258	1'267	1'277	
Contents	in cubic feet		26'21	26'43	26'64	26'85	27'06	27'26	27'47	27'67	27'88	28'08	
Weight	in lbs.		1179	1189	1198	1208	1217	1227	1236	1245	1254	1263	
Breaking-weight per sup. foot	in lbs.		144'8	144'3	143'6	143'1	142'6	142'0	141'4	141'0	140'4	139'9	
Weight distributed	in lbs.		13420	13640	13860	14080	14300	14520	14740	14960	15180	15400	
Breaking-weight distributed	...	19430	19678	19918	20152	20389	20622	20856	21090	21322	21553		
Depth of beam	in inches	24'	16'10	16'17	16'23	16'30	16'36	16'42	16'49	16'54	16'60	16'66	
Breadth of beam	in inches		11'38	11'43	11'48	11'52	11'57	11'62	11'67	11'70	11'74	11'78	
Sectional area	in sup. feet		1'274	1'284	1'295	1'304	1'314	1'325	1'334	1'344	1'354	1'364	
Contents	in cubic feet		29'29	29'53	30'00	30'24	30'47	30'70	30'93	31'15	31'35	31'55	
Weight	in lbs.		1318	1329	1339	1350	1360	1371	1381	1391	1402	1412	
Breaking-weight per sup. foot	in lbs.	25'	146'4	145'8	145'0	144'1	143'6	143'0	142'5	142'0	141'5	141'0	
Weight distributed	in lbs.		14090	14280	14490	14720	14950	15180	15410	15640	15870	16100	
Breaking-weight distributed	...		20540	20863	21052	21302	21553	21800	22048	22293	22540	22784	
Depth of beam	in inches		16'62	16'69	16'76	16'83	16'89	16'95	17'03	17'08	17'14	17'21	17'27
Breadth of beam	in inches		11'57	11'81	11'85	11'90	11'94	11'99	12'03	12'08	12'12	12'17	12'21
Sectional area	in sup. feet	26'	1'357	1'368	1'379	1'390	1'401	1'412	1'423	1'433	1'443	1'454	
Contents	in cubic feet		32'58	32'85	33'11	33'37	33'63	33'89	34'14	34'40	34'65	34'90	
Weight	in lbs.		1468	1480	1490	1501	1513	1525	1536	1548	1559	1571	
Breaking-weight per sup. foot	in lbs.		148'0	147'4	146'8	146'3	145'7	145'1	144'6	144'0	143'5	143'0	
Weight distributed	in lbs.		14640	14880	15120	15360	15600	15840	16080	16320	16560	16800	
Breaking-weight distributed	...	21670	21939	22203	22465	22730	22991	23253	23510	23770	24029		
Depth of beam	in inches	27'	17'14	17'21	17'28	17'35	17'42	17'48	17'55	17'61	17'68	17'75	
Breadth of beam	in inches		12'12	12'17	12'22	12'27	12'31	12'36	12'41	12'45	12'51	12'54	
Sectional area	in sup. feet		1'443	1'454	1'466	1'478	1'490	1'501	1'512	1'523	1'535	1'546	
Contents	in cubic feet		36'08	36'38	36'67	36'96	37'25	37'53	37'82	38'10	38'38	38'65	
Weight	in lbs.		1623	1637	1650	1663	1676	1689	1701	1714	1727	1739	
Breaking-weight per sup. foot	in lbs.	28'	149'5	149'0	148'3	147'7	147'2	146'6	146'0	145'6	145'0	144'5	
Weight distributed	in lbs.		15250	15500	15750	16000	16250	16500	16750	17000	17250	17500	
Breaking-weight distributed	...		22810	23088	23368	23641	23922	24195	24471	24743	25016	25288	
Depth of beam	in inches		17'65	17'72	17'79	17'87	17'93	18'00	18'08	18'14	18'20	18'27	18'32
Breadth of beam	in inches		12'48	12'54	12'58	12'63	12'68	12'73	12'78	12'83	12'87	12'92	12'96
Sectional area	in sup. feet	29'	1'552	1'564	1'577	1'589	1'602	1'615	1'626	1'638	1'650	1'662	
Contents	in cubic feet		39'80	40'13	40'45	40'77	41'09	41'40	41'71	42'02	42'33	42'64	
Weight	in lbs.		1791	1805	1820	1834	1849	1863	1877	1891	1905	1919	
Breaking-weight per sup. foot	in lbs.		151'1	150'5	149'8	149'2	148'6	148'0	147'5	146'9	146'4	145'9	
Weight distributed	in lbs.		15880	16120	16380	16640	16900	17160	17420	17680	17940	18200	
Breaking-weight distributed	...	23050	23428	23803	24180	24557	24934	25310	25686	26062	26438		
Depth of beam	in inches	30'	18'16	18'23	18'31	18'38	18'46	18'52	18'59	18'66	18'73	18'80	
Breadth of beam	in inches		12'84	12'89	12'95	12'99	13'05	13'10	13'14	13'19	13'25	13'29	13'34
Sectional area	in sup. feet		1'680	1'694	1'706	1'719	1'732	1'745	1'757	1'770	1'782	1'795	1'808
Contents	in cubic feet		43'74	44'10	44'45	44'80	45'15	45'49	45'84	46'18	46'52	46'85	47'19
Weight	in lbs.		1968	1984	2000	2016	2031	2047	2062	2078	2093	2108	2123
Breaking-weight per sup. foot	in lbs.	31'	152'5	151'8	151'2	150'6	150'0	149'4	148'9	148'3	147'8	147'2	
Weight distributed	in lbs.		16470	16740	17010	17290	17560	17830	18100	18380	18660	18940	
Breaking-weight distributed	...		25110	25420	25725	26030	26334	26638	26942	27241	27540	27841	
Depth of beam	in inches		18'67	18'74	18'81	18'89	18'96	19'03	19'10	19'18	19'25	19'31	19'38
Breadth of beam	in inches		13'19	13'25	13'31	13'35	13'41	13'46	13'51	13'57	14'01	14'06	14'11
Sectional area	in sup. feet	32'	1'711	1'724	1'738	1'752	1'767	1'779	1'793	1'806	1'819	1'833	
Contents	in cubic feet		47'90	48'29	48'68	49'07	49'45	49'83	50'20	50'58	50'95	51'31	
Weight	in lbs.		2155	2173	2190	2209	2225	2242	2259	2276	2292	2309	2325
Breaking-weight per sup. foot	in lbs.		153'9	153'2	152'6	152'0	151'4	150'8	150'2	149'7	149'1	148'6	148'0
Weight distributed	in lbs.		17080	17360	17640	17920	18200	18480	18760	19040	19320	19600	19880
Breaking-weight distributed	...	26270	26602	26921	27242	27562	27878	28195	28509	28824	29136	29448	
Depth of beam	in inches	33'	19'16	19'24	19'31	19'39	19'47	19'55	19'61	19'69	19'76	19'83	
Breadth of beam	in inches		13'55	13'60	13'66	13'71	13'76	13'82	13'87	13'92	13'97	14'02	14'07
Sectional area	in sup. feet		1'804	1'818	1'833	1'847	1'861	1'875	1'890	1'904	1'918	1'931	1'945
Contents	in cubic feet		52'29	52'73	53'14	53'56	53'98	54'40	54'81	55'21	55'62	56'02	56'43
Weight	in lbs.		2353	2372	2391	2410	2429	2447	2467	2484	2503	2521	2539
Breaking-weight per sup. foot	in lbs.	34'	155'2	154'3	153'9	153'3	152'8	152'1	151'6	151'1	150'5	149'9	
Weight distributed	in lbs.		17600	17980	18270	18560	18850	19140	19430	19720	20010	20300	20590
Breaking-weight distributed	...		27450	27731	28129	28463	28798	29128	29460	29790	30116	30442	30768
Depth of beam	in inches		19'65	19'73	19'82	19'89	19'97	20'05	20'12	20'19	20'27	20'34	20'41
Breadth of beam	in inches		13'90	13'95	14'01	14'07	14'13	14'17	14'23	14'28	14'33	14'38	14'43
Sectional area	in sup. feet	35'	1'897	1'913	1'928	1'943	1'958	1'973	1'988	2'003	2'018	2'033	
Contents	in cubic feet		56'92	57'39	57'83	58'30	58'76	59'21	59'65	60'10	60'54	60'97	61'41
Weight	in lbs.		2561	2583	2603	2623	2644	2664	2684	2704	2724	2744	2764
Breaking-weight per sup. foot	in lbs.		156'3	155'9	155'3	154'6	154'0	153'5	152'9	152'3	151'7	151'2	150'6
Weight distributed	in lbs.		18600	18900	19200	19500	19800	20100	20400	20700	21000	21300	21600
Breaking-weight distributed	...	28650	28998	29346	29695	30044	30388	30734	31076	31418	31760	32102	

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre = S.									
		7-1	7-2	7-3	7-4	7-5	7-6	7-7	7-8	7-9	8-0
Depth of beam in inches	21	15.62	15.68	15.73	15.78	15.84	15.89	15.94	16.00	16.04	16.09
Breadth of beam in inches		11.05	11.08	11.12	11.16	11.20	11.23	11.28	11.31	11.34	11.38
Sectional area in sup. feet		1.198	1.207	1.215	1.224	1.232	1.240	1.248	1.257	1.264	1.272
Contents in cubic feet		25.18	25.36	25.53	25.71	25.87	26.04	26.22	26.38	26.55	26.72
Weight in lbs.		1133	1141	1149	1157	1165	1173	1181	1189	1197	1204
Breaking-weight per sup. foot in lbs.	22	137.8	137.3	136.8	136.4	135.9	135.6	135.0	134.6	134.2	133.7
Weight distributed in lbs.		14910	15120	15330	15540	15750	15960	16170	16380	16590	16800
Breaking-weight distributed		20550	20760	20980	21200	21410	21630	21840	22050	22260	22470
Depth of beam in inches		16.18	16.23	16.29	16.34	16.40	16.45	16.51	16.56	16.61	16.67
Breadth of beam in inches		11.44	11.48	11.52	11.56	11.59	11.63	11.67	11.71	11.75	11.78
Sectional area in sup. feet	23	1.236	1.245	1.254	1.263	1.271	1.280	1.288	1.297	1.305	1.313
Contents in cubic feet		28.28	28.46	28.67	28.87	29.06	29.26	29.45	29.64	29.83	30.02
Weight in lbs.		1272	1281	1290	1299	1308	1316	1325	1334	1342	1350
Breaking-weight per sup. foot in lbs.		139.4	138.9	138.4	138.0	137.5	137.1	136.6	136.2	135.7	135.3
Weight distributed in lbs.		15620	15840	16060	16280	16500	16720	16940	17160	17380	17600
Breaking-weight distributed		21780	22010	22240	22470	22690	22920	23150	23370	23590	23810
Depth of beam in inches	24	16.72	16.78	16.84	16.90	16.95	17.01	17.07	17.12	17.18	17.23
Breadth of beam in inches		11.82	11.87	11.91	11.95	11.99	12.03	12.07	12.11	12.14	12.18
Sectional area in sup. feet		1.375	1.384	1.394	1.403	1.412	1.421	1.431	1.440	1.449	1.458
Contents in cubic feet		31.60	31.82	32.04	32.26	32.48	32.69	32.91	33.12	33.33	33.54
Weight in lbs.		1422	1432	1442	1452	1461	1471	1481	1490	1500	1509
Breaking-weight per sup. foot in lbs.	25	141.0	140.5	140.0	139.5	139.1	138.6	138.1	137.8	137.3	136.8
Weight distributed in lbs.		16330	16560	16790	17020	17250	17480	17710	17940	18170	18400
Breaking-weight distributed		23030	23270	23510	23740	23990	24230	24470	24710	24950	25180
Depth of beam in inches		17.27	17.33	17.39	17.45	17.51	17.56	17.62	17.68	17.73	17.79
Breadth of beam in inches		12.21	12.25	12.29	12.34	12.38	12.42	12.46	12.51	12.54	12.58
Sectional area in sup. feet	26	1.464	1.475	1.485	1.495	1.505	1.515	1.525	1.535	1.545	1.554
Contents in cubic feet		35.15	35.39	35.64	35.88	36.12	36.36	36.60	36.84	37.08	37.31
Weight in lbs.		1582	1593	1604	1615	1626	1637	1647	1658	1668	1679
Breaking-weight per sup. foot in lbs.		142.5	142.0	141.5	141.0	140.5	140.1	139.7	139.2	138.7	138.3
Weight distributed in lbs.		17040	17280	17520	17760	18000	18240	18480	18720	18960	19200
Breaking-weight distributed		24280	24540	24790	25050	25300	25550	25800	26060	26310	26560
Depth of beam in inches	27	17.80	17.87	17.93	17.99	18.05	18.12	18.17	18.23	18.29	18.34
Breadth of beam in inches		12.59	12.63	12.68	12.72	12.77	12.81	12.85	12.89	12.93	12.98
Sectional area in sup. feet		1.556	1.567	1.578	1.589	1.600	1.611	1.621	1.631	1.642	1.652
Contents in cubic feet		39.93	40.20	40.47	40.74	41.01	41.28	41.54	41.81	42.07	42.34
Weight in lbs.		1752	1764	1776	1788	1800	1812	1824	1836	1848	1859
Breaking-weight per sup. foot in lbs.	28	143.9	143.4	142.9	142.5	142.0	141.5	141.0	140.7	140.1	139.7
Weight distributed in lbs.		17550	17800	18050	18300	18550	18800	19050	19300	19550	19800
Breaking-weight distributed		25550	25800	26050	26300	26550	26800	27050	27300	27550	27800
Depth of beam in inches		18.33	18.40	18.46	18.53	18.59	18.65	18.71	18.77	18.83	18.89
Breadth of beam in inches		12.96	13.01	13.06	13.10	13.14	13.19	13.23	13.28	13.31	13.36
Sectional area in sup. feet	29	1.674	1.686	1.698	1.710	1.721	1.732	1.744	1.755	1.767	1.777
Contents in cubic feet		42.94	43.24	43.54	43.84	44.13	44.43	44.73	45.01	45.29	45.58
Weight in lbs.		1932	1946	1960	1973	1987	2000	2012	2025	2038	2050
Breaking-weight per sup. foot in lbs.		145.4	144.9	144.4	143.9	143.4	142.9	142.4	141.9	141.5	141.1
Weight distributed in lbs.		18460	18720	18980	19240	19500	19760	20020	20280	20540	20800
Breaking-weight distributed		26840	27120	27400	27680	27960	28240	28520	28800	29070	29350
Depth of beam in inches	30	18.86	18.93	18.99	19.06	19.12	19.19	19.25	19.31	19.37	19.43
Breadth of beam in inches		13.34	13.38	13.43	13.48	13.53	13.57	13.61	13.65	13.70	13.75
Sectional area in sup. feet		1.747	1.760	1.772	1.784	1.796	1.808	1.820	1.831	1.843	1.855
Contents in cubic feet		47.19	47.52	47.85	48.17	48.50	48.82	49.14	49.46	49.78	50.09
Weight in lbs.		2124	2138	2152	2166	2180	2194	2208	2222	2236	2250
Breaking-weight per sup. foot in lbs.	31	146.7	146.3	145.7	145.3	144.7	144.3	143.8	143.3	142.9	142.4
Weight distributed in lbs.		19170	19440	19710	19980	20250	20520	20790	21060	21330	21600
Breaking-weight distributed		28130	28430	28730	29020	29310	29600	29890	30180	30470	30760
Depth of beam in inches		19.38	19.46	19.52	19.59	19.65	19.72	19.78	19.84	19.91	19.97
Breadth of beam in inches		13.71	13.75	13.81	13.85	13.89	13.94	13.99	14.03	14.08	14.12
Sectional area in sup. feet	32	1.846	1.860	1.874	1.888	1.902	1.916	1.930	1.944	1.958	1.972
Contents in cubic feet		51.68	52.04	52.40	52.76	53.12	53.47	53.82	54.17	54.51	54.86
Weight in lbs.		2325	2342	2358	2374	2390	2406	2422	2437	2453	2468
Breaking-weight per sup. foot in lbs.		148.1	147.6	147.1	146.6	146.1	145.6	145.1	144.6	144.3	143.7
Weight distributed in lbs.		19880	20160	20440	20720	21000	21280	21560	21840	22120	22400
Breaking-weight distributed		29610	29950	30290	30630	30970	31310	31650	31990	32330	32670
Depth of beam in inches	33	19.90	19.97	20.04	20.11	20.17	20.24	20.31	20.38	20.44	20.50
Breadth of beam in inches		14.07	14.12	14.17	14.22	14.27	14.31	14.36	14.41	14.46	14.50
Sectional area in sup. feet		1.946	1.960	1.973	1.987	1.999	2.012	2.026	2.039	2.052	2.065
Contents in cubic feet		56.42	56.81	57.21	57.60	57.99	58.37	58.75	59.13	59.51	59.89
Weight in lbs.		2539	2556	2574	2592	2609	2626	2644	2661	2678	2695
Breaking-weight per sup. foot in lbs.	34	149.4	148.9	148.3	147.8	147.4	146.9	146.4	145.9	145.4	145.0
Weight distributed in lbs.		20590	20880	21170	21460	21750	22040	22330	22620	22910	23200
Breaking-weight distributed		30830	31190	31550	31910	32270	32630	32990	33350	33710	34070
Depth of beam in inches		20.42	20.48	20.56	20.63	20.69	20.76	20.83	20.90	20.97	21.03
Breadth of beam in inches		14.43	14.49	14.54	14.58	14.63	14.68	14.73	14.78	14.83	14.87
Sectional area in sup. feet	35	2.047	2.061	2.075	2.090	2.104	2.117	2.131	2.145	2.159	2.173
Contents in cubic feet		61.41	61.84	62.27	62.69	63.11	63.54	63.95	64.36	64.77	65.18
Weight in lbs.		2763	2782	2802	2821	2840	2859	2878	2896	2915	2933
Breaking-weight per sup. foot in lbs.		150.7	150.1	149.7	149.1	148.6	148.1	147.6	147.2	146.7	146.3
Weight distributed in lbs.		21300	21600	21900	22200	22500	22800	23100	23400	23700	24000
Breaking-weight distributed		32090	32440	32790	33140	33490	33840	34190	34540	34890	35240

Table No. VIII.—Burma Teak.

$$\frac{P_b}{E_d} = \frac{800}{3900}$$

$$\frac{d}{b} = \sqrt{2}$$

Deflection Formulae.

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	8-9	9-0
Depth of beam	in inches	21	16.15	16.19	16.24	16.30	16.34	16.39	16.44	16.49	16.53	16.58
Breadth of beam	in inches		11.41	11.45	11.49	11.52	11.55	11.59	11.62	11.65	11.69	11.73
Sectional area	in sup. feet		1.280	1.289	1.296	1.304	1.311	1.319	1.327	1.334	1.342	1.349
Contents	in cubic feet		26.89	27.05	27.22	27.38	27.55	27.70	27.87	28.03	28.19	28.34
Weight	in lbs.		1210	1217	1225	1232	1239	1246	1254	1261	1268	1275
Breaking-weight per sup. foot	in lbs.	22	133.4	132.9	132.5	132.2	131.7	131.3	131.0	130.7	130.2	129.9
Weight distributed	in lbs.		17010	17220	17430	17640	17850	18060	18270	18480	18690	18900
Breaking-weight distributed	...		22690	22900	23110	23310	23520	23730	23940	24140	24340	24550
Depth of beam	in inches	22	16.72	16.77	16.82	16.87	16.92	16.97	17.03	17.07	17.12	17.16
Breadth of beam	in inches		11.82	11.86	11.89	11.93	11.97	12.00	12.03	12.07	12.11	12.14
Sectional area	in sup. feet		1.373	1.381	1.390	1.398	1.407	1.414	1.423	1.431	1.439	1.447
Contents	in cubic feet		30.20	30.39	30.57	30.77	30.94	31.12	31.30	31.48	31.66	31.85
Weight	in lbs.		1359	1367	1378	1384	1392	1400	1408	1416	1424	1433
Breaking-weight per sup. foot	in lbs.	23	134.9	134.5	134.1	133.7	133.3	132.9	132.5	132.2	131.7	131.4
Weight distributed	in lbs.		17820	18040	18260	18480	18700	18920	19140	19360	19580	19800
Breaking-weight distributed	...		24050	24270	24490	24710	24930	25150	25370	25590	25800	26020
Depth of beam	in inches	23	17.28	17.34	17.39	17.44	17.49	17.55	17.60	17.65	17.70	17.75
Breadth of beam	in inches		12.22	12.26	12.30	12.34	12.37	12.40	12.45	12.48	12.51	12.55
Sectional area	in sup. feet		1.467	1.476	1.485	1.494	1.504	1.512	1.521	1.529	1.539	1.547
Contents	in cubic feet		33.75	33.97	34.17	34.37	34.58	34.78	34.98	35.18	35.38	35.58
Weight	in lbs.		1517	1528	1537	1547	1557	1567	1574	1583	1593	1601
Breaking-weight per sup. foot	in lbs.	24	136.4	136.0	135.6	135.3	134.8	134.4	134.0	133.6	133.2	132.9
Weight distributed	in lbs.		19630	19860	20090	20320	20550	20780	21010	21240	21470	21700
Breaking-weight distributed	...		25420	25650	25890	26120	26350	26590	26820	27050	27280	27510
Depth of beam	in inches	24	17.85	17.90	17.95	18.01	18.06	18.12	18.17	18.22	18.27	18.33
Breadth of beam	in inches		12.62	12.66	12.70	12.74	12.77	12.81	12.84	12.89	12.92	12.95
Sectional area	in sup. feet		1.564	1.574	1.583	1.593	1.602	1.612	1.621	1.630	1.640	1.649
Contents	in cubic feet		37.54	37.77	38.00	38.23	38.46	38.68	38.91	39.13	39.36	39.57
Weight	in lbs.		1789	1790	1791	1790	1791	1790	1789	1787	1781	1781
Breaking-weight per sup. foot	in lbs.	25	137.9	137.5	137.0	136.6	136.2	135.9	135.4	135.0	134.6	134.3
Weight distributed	in lbs.		19440	19680	19920	20160	20400	20640	20880	21120	21360	21600
Breaking-weight distributed	...		26800	27050	27300	27550	27790	28040	28280	28520	28770	29010
Depth of beam	in inches	25	18.40	18.46	18.51	18.57	18.63	18.68	18.73	18.79	18.84	18.89
Breadth of beam	in inches		13.01	13.05	13.10	13.13	13.17	13.21	13.25	13.28	13.32	13.36
Sectional area	in sup. feet		1.663	1.673	1.683	1.693	1.703	1.713	1.723	1.733	1.743	1.753
Contents	in cubic feet		41.58	41.83	42.09	42.34	42.59	42.84	43.09	43.34	43.59	43.83
Weight	in lbs.		1871	1882	1894	1906	1916	1928	1939	1950	1961	1973
Breaking-weight per sup. foot	in lbs.	26	139.4	138.8	138.4	138.1	137.6	137.2	136.8	136.5	136.0	135.7
Weight distributed	in lbs.		20250	20500	20750	21000	21250	21500	21750	22000	22250	22500
Breaking-weight distributed	...		28210	28470	28740	29000	29250	29500	29760	30020	30270	30530
Depth of beam	in inches	26	18.95	19.02	19.07	19.12	19.18	19.24	19.29	19.35	19.40	19.46
Breadth of beam	in inches		13.40	13.44	13.48	13.53	13.56	13.60	13.64	13.68	13.72	13.76
Sectional area	in sup. feet		1.788	1.799	1.810	1.821	1.833	1.843	1.854	1.864	1.875	1.885
Contents	in cubic feet		45.87	46.15	46.43	46.71	46.98	47.26	47.54	47.81	48.08	48.35
Weight	in lbs.		2064	2076	2090	2102	2114	2126	2139	2151	2163	2175
Breaking-weight per sup. foot	in lbs.	27	140.7	140.2	139.8	139.4	139.0	138.6	138.2	137.8	137.5	137.0
Weight distributed	in lbs.		21060	21320	21580	21840	22100	22360	22620	22880	23140	23400
Breaking-weight distributed	...		29630	29900	30170	30450	30720	30990	31270	31530	31800	32070
Depth of beam	in inches	27	19.49	19.55	19.61	19.67	19.73	19.79	19.85	19.90	19.96	20.01
Breadth of beam	in inches		13.78	13.83	13.87	13.91	13.95	13.99	14.03	14.07	14.11	14.15
Sectional area	in sup. feet		1.867	1.878	1.889	1.902	1.912	1.924	1.934	1.946	1.957	1.967
Contents	in cubic feet		50.40	50.71	51.02	51.33	51.63	51.93	52.23	52.53	52.83	53.13
Weight	in lbs.		2268	2282	2296	2309	2323	2337	2350	2364	2377	2390
Breaking-weight per sup. foot	in lbs.	28	142.0	141.6	141.1	140.7	140.3	139.9	139.5	139.1	138.3	137.0
Weight distributed	in lbs.		21870	22140	22410	22680	22950	23220	23490	23760	24030	24300
Breaking-weight distributed	...		31060	31340	31630	31920	32200	32480	32770	33050	33330	33610
Depth of beam	in inches	28	20.03	20.10	20.16	20.22	20.28	20.34	20.39	20.45	20.52	20.57
Breadth of beam	in inches		14.16	14.21	14.25	14.29	14.34	14.38	14.43	14.46	14.50	14.54
Sectional area	in sup. feet		1.971	1.983	1.996	2.007	2.019	2.031	2.043	2.055	2.067	2.078
Contents	in cubic feet		55.20	55.54	55.88	56.21	56.55	56.88	57.21	57.54	57.86	58.19
Weight	in lbs.		2484	2499	2514	2529	2544	2559	2574	2589	2604	2619
Breaking-weight per sup. foot	in lbs.	29	143.3	142.8	142.4	142.0	141.6	141.1	140.7	140.3	139.6	137.0
Weight distributed	in lbs.		22660	22920	23180	23440	23700	23960	24220	24480	24740	25000
Breaking-weight distributed	...		32500	32800	33100	33410	33700	34000	34300	34590	34880	35180
Depth of beam	in inches	29	20.57	20.63	20.69	20.76	20.82	20.88	20.95	21.00	21.06	21.12
Breadth of beam	in inches		14.54	14.59	14.63	14.68	14.72	14.76	14.80	14.85	14.89	14.93
Sectional area	in sup. feet		2.078	2.090	2.103	2.116	2.129	2.141	2.153	2.166	2.178	2.190
Contents	in cubic feet		60.26	60.63	61.00	61.37	61.73	62.09	62.45	62.82	63.17	63.52
Weight	in lbs.		2711	2728	2745	2761	2778	2794	2810	2826	2842	2858
Breaking-weight per sup. foot	in lbs.	30	144.6	144.1	143.7	143.3	142.8	142.4	142.0	141.6	141.2	140.8
Weight distributed	in lbs.		23490	23780	24070	24360	24650	24940	25230	25520	25810	26100
Breaking-weight distributed	...		33970	34280	34590	34900	35200	35500	35800	36100	36400	36700
Depth of beam	in inches	30	21.10	21.16	21.23	21.29	21.35	21.42	21.48	21.54	21.60	21.66
Breadth of beam	in inches		14.92	14.97	15.01	15.05	15.11	15.14	15.19	15.23	15.27	15.32
Sectional area	in sup. feet		2.186	2.199	2.214	2.226	2.239	2.253	2.266	2.279	2.292	2.304
Contents	in cubic feet		65.59	65.99	66.40	66.79	67.19	67.58	67.98	68.37	68.76	69.14
Weight	in lbs.		2952	2969	2988	3005	3022	3041	3059	3077	3094	3111
Breaking-weight per sup. foot	in lbs.	31	145.8	145.3	144.9	144.5	144.0	143.6	143.3	142.8	142.4	142.0
Weight distributed	in lbs.		24900	25200	25500	25800	26100	26400	26700	27000	27300	27600
Breaking-weight distributed	...		35430	35760	36090	36410	36740	37060	37380	37700	38020	38340

Table No. VIII.—Burma Teak.

Deflection Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre = S.									
			9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	10-0
Depth of beam	in inches	21	16-62	16-67	16-72	16-76	16-80	16-85	16-89	16-93	16-98	17-03
Breadth of beam	in inches		11-75	11-78	11-82	11-85	11-88	11-92	11-94	11-97	12-00	12-03
Sectional area	in sup. feet		1-857	1-865	1-872	1-879	1-887	1-894	1-901	1-908	1-915	1-923
Contents	in cubic feet		28-50	28-65	28-81	28-97	29-12	29-27	29-42	29-57	29-73	29-88
Weight	in lbs.		1283	1289	1296	1304	1310	1317	1324	1331	1337	1344
Breaking-weight per sup. foot	in lbs.		129-5	129-2	128-9	128-5	128-1	127-8	127-5	127-2	126-8	126-5
Weight distributed	in lbs.		19110	19230	19350	19470	19590	19710	19830	19950	20070	21000
Breaking-weight distributed	...		24750	24960	25160	25360	25560	25770	25970	26170	26370	26570
Depth of beam	in inches	22	17-21	17-26	17-31	17-35	17-40	17-44	17-49	17-53	17-58	17-62
Breadth of beam	in inches		12-17	12-20	12-23	12-27	12-31	12-34	12-36	12-40	12-43	12-46
Sectional area	in sup. feet		1-455	1-463	1-471	1-480	1-487	1-494	1-502	1-511	1-518	1-525
Contents	in cubic feet		32-01	32-19	32-36	32-54	32-71	32-89	33-05	33-22	33-39	33-56
Weight	in lbs.		1440	1448	1456	1464	1472	1480	1487	1495	1502	1511
Breaking-weight per sup. foot	in lbs.		131-0	130-7	130-4	130-0	129-6	129-3	129-0	128-6	128-3	128-0
Weight distributed	in lbs.		20020	20240	20460	20680	20900	21120	21340	21560	21780	22000
Breaking-weight distributed	...		26240	26450	26670	26880	27100	27310	27520	27740	27950	28160
Depth of beam	in inches	23	17-80	17-84	17-89	17-94	17-99	18-04	18-08	18-13	18-17	18-22
Breadth of beam	in inches		12-58	12-62	12-65	12-68	12-72	12-75	12-78	12-82	12-85	12-89
Sectional area	in sup. feet		1-555	1-564	1-572	1-581	1-589	1-598	1-606	1-616	1-622	1-630
Contents	in cubic feet		35-78	35-98	36-17	36-36	36-55	36-75	36-94	37-13	37-32	37-50
Weight	in lbs.		1610	1619	1627	1636	1645	1653	1662	1670	1679	1687
Breaking-weight per sup. foot	in lbs.		132-5	132-2	131-8	131-4	131-1	130-7	130-4	130-1	129-8	129-5
Weight distributed	in lbs.		20930	21160	21390	21620	21850	22080	22310	22540	22770	23000
Breaking-weight	...		27740	27900	28190	28420	28650	28870	29090	29320	29540	29770
Depth of beam	in inches	24	18-37	18-42	18-47	18-52	18-57	18-63	18-67	18-72	18-76	18-81
Breadth of beam	in inches		12-99	13-03	13-07	13-10	13-13	13-16	13-20	13-23	13-27	13-31
Sectional area	in sup. feet		1-658	1-668	1-676	1-685	1-694	1-703	1-712	1-720	1-729	1-738
Contents	in cubic feet		39-79	40-01	40-23	40-44	40-66	40-87	41-08	41-29	41-51	41-71
Weight	in lbs.		1791	1800	1810	1820	1829	1839	1848	1858	1867	1877
Breaking-weight per sup. foot	in lbs.		139-9	139-5	139-2	138-8	138-5	138-2	137-9	137-6	137-3	137-0
Weight distributed	in lbs.		21840	22080	22320	22560	22800	23040	23280	23520	23760	24000
Breaking-weight distributed	...		29250	29490	29730	29970	30210	30450	30690	30920	31160	31390
Depth of beam	in inches	25	18-94	19-00	19-05	19-10	19-15	19-20	19-25	19-30	19-35	19-40
Breadth of beam	in inches		13-40	13-43	13-47	13-50	13-54	13-57	13-61	13-65	13-68	13-71
Sectional area	in sup. feet		1-762	1-772	1-781	1-791	1-801	1-810	1-820	1-829	1-838	1-847
Contents	in cubic feet		44-07	44-31	44-55	44-79	45-03	45-27	45-50	45-73	45-97	46-20
Weight	in lbs.		1983	1994	2005	2015	2026	2037	2047	2058	2068	2079
Breaking-weight per sup. foot	in lbs.		135-3	134-9	134-6	134-2	133-8	133-5	133-1	132-8	132-5	132-2
Weight distributed	in lbs.		22750	23000	23250	23500	23750	24000	24250	24500	24750	25000
Breaking-weight distributed	...		30780	31030	31290	31540	31790	32040	32290	32540	32790	33040
Depth of beam	in inches	26	19-51	19-56	19-62	19-67	19-73	19-77	19-82	19-87	19-92	19-97
Breadth of beam	in inches		13-79	13-84	13-87	13-91	13-94	13-98	14-02	14-05	14-09	14-13
Sectional area	in sup. feet		1-896	1-906	1-916	1-927	1-937	1-947	1-957	1-967	1-977	1-987
Contents	in cubic feet		48-61	48-88	49-15	49-41	49-67	49-93	50-19	50-45	50-71	50-96
Weight	in lbs.		2188	2199	2211	2224	2235	2247	2258	2269	2280	2291
Breaking-weight per sup. foot	in lbs.		136-6	136-2	135-9	135-6	135-3	134-9	134-6	134-3	134-0	133-7
Weight distributed	in lbs.		23660	23920	24180	24440	24700	24960	25220	25480	25740	26000
Breaking-weight distributed	...		32330	32600	32860	33130	33390	33660	33920	34180	34440	34700
Depth of beam	in inches	27	20-07	20-12	20-18	20-24	20-29	20-34	20-39	20-44	20-50	20-55
Breadth of beam	in inches		14-20	14-23	14-27	14-31	14-34	14-38	14-43	14-46	14-50	14-53
Sectional area	in sup. feet		1-979	1-989	2-000	2-011	2-021	2-033	2-043	2-053	2-064	2-074
Contents	in cubic feet		53-42	53-71	54-01	54-29	54-58	54-87	55-15	55-44	55-72	56-00
Weight	in lbs.		2404	2417	2430	2443	2456	2469	2482	2495	2507	2520
Breaking-weight per sup. foot	in lbs.		137-9	137-5	137-2	136-8	136-5	136-1	135-7	135-4	135-0	134-7
Weight distributed	in lbs.		24570	24840	25110	25380	25650	25920	26190	26460	26730	27000
Breaking-weight distributed	...		33890	34170	34450	34680	34910	35140	35370	35600	35830	36060
Depth of beam	in inches	28	20-63	20-68	20-74	20-80	20-85	20-90	20-96	21-01	21-06	21-12
Breadth of beam	in inches		14-58	14-63	14-66	14-70	14-74	14-78	14-82	14-86	14-90	14-93
Sectional area	in sup. feet		2-090	2-101	2-112	2-124	2-135	2-146	2-157	2-168	2-179	2-190
Contents	in cubic feet		58-51	58-83	59-15	59-46	59-78	60-10	60-41	60-72	61-03	61-33
Weight	in lbs.		2633	2647	2661	2676	2690	2704	2718	2732	2746	2760
Breaking-weight per sup. foot	in lbs.		139-2	138-8	138-4	138-1	137-8	137-5	137-2	136-9	136-6	136-3
Weight distributed	in lbs.		25480	25760	26040	26320	26600	26880	27160	27440	27720	28000
Breaking-weight distributed	...		35470	35760	36050	36340	36630	36920	37210	37500	37780	38070
Depth of beam	in inches	29	21-18	21-24	21-29	21-35	21-40	21-46	21-52	21-57	21-63	21-68
Breadth of beam	in inches		14-97	15-01	15-05	15-09	15-14	15-18	15-21	15-25	15-29	15-33
Sectional area	in sup. feet		2-202	2-214	2-226	2-238	2-250	2-262	2-274	2-286	2-297	2-309
Contents	in cubic feet		63-87	64-22	64-57	64-92	65-26	65-61	65-95	66-28	66-62	66-96
Weight	in lbs.		2874	2890	2904	2919	2933	2947	2961	2975	2989	3004
Breaking-weight per sup. foot	in lbs.		140-4	140-0	139-7	139-4	139-1	138-8	138-5	138-2	137-9	137-6
Weight distributed	in lbs.		26390	26680	26970	27260	27550	27840	28130	28420	28710	29000
Breaking-weight distributed	...		37060	37360	37650	37950	38250	38550	38850	39150	39450	39750
Depth of beam	in inches	30	21-72	21-78	21-84	21-90	21-96	22-01	22-07	22-13	22-19	22-24
Breadth of beam	in inches		15-36	15-40	15-44	15-48	15-53	15-57	15-60	15-64	15-68	15-72
Sectional area	in sup. feet		2-318	2-330	2-342	2-354	2-366	2-378	2-390	2-402	2-414	2-426
Contents	in cubic feet		69-52	69-90	70-28	70-66	71-03	71-41	71-78	72-14	72-51	72-88
Weight	in lbs.		3128	3145	3162	3179	3196	3213	3230	3246	3263	3279
Breaking-weight per sup. foot	in lbs.		141-6	141-2	140-8	140-4	140-1	139-7	139-4	139-0	138-7	138-3
Weight distributed	in lbs.		27300	27600	27900	28200	28500	28800	29100	29400	29700	30000
Breaking-weight distributed	...		38600	38900	39200	39500	39800	40100	40400	40700	41000	41300

Table No. VIII.—Burma Teak.

Deflection Formulæ.

$$\frac{P_b}{E_d} = 800 \quad \frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		21'	22'	23'	24'	25'	26'	27'	28'	29'	30'
Depth of beam in inches	21'	20.49	20.73	20.96	21.19	21.40	21.61	21.82	22.02	22.22	22.40
Breadth of beam in inches		14.49	14.66	14.83	14.98	15.14	15.29	15.43	15.56	15.71	15.81
Sectional area in sup. feet		2.062	2.110	2.158	2.204	2.250	2.294	2.338	2.381	2.423	2.464
Contents in cubic feet		43.30	44.32	45.31	46.29	47.24	48.18	49.10	49.99	50.88	51.75
Weight in lbs.		1949	1994	2039	2083	2126	2168	2209	2250	2290	2329
Breaking-weight per sup. foot in lbs.		105.1	103.9	102.7	101.6	100.6	99.65	98.71	97.81	96.93	96.15
Weight distributed in lbs.		44100	46200	48300	50400	52500	54600	56700	58800	60900	63000
Breaking-weight distributed		46350	48000	49620	51230	52830	54390	55970	57510	59050	60570
Depth of beam in inches	22'	21.21	21.47	21.71	21.94	22.16	22.38	22.59	22.80	23.00	23.20
Breadth of beam in inches		15.01	15.18	15.35	15.52	15.67	15.83	15.98	16.11	16.26	16.37
Sectional area in sup. feet		2.211	2.263	2.314	2.364	2.413	2.460	2.507	2.553	2.598	2.642
Contents in cubic feet		48.64	49.78	50.90	51.99	53.07	54.12	55.15	56.16	57.15	58.13
Weight in lbs.		2189	2240	2290	2340	2388	2435	2482	2527	2572	2616
Breaking-weight per sup. foot in lbs.		106.3	105.1	103.9	102.9	101.8	100.8	99.86	98.96	98.09	97.26
Weight distributed in lbs.		46200	48400	50600	52800	55000	57200	59400	61600	63800	66000
Breaking-weight distributed		49130	50870	52600	54300	55990	57600	59320	60960	62580	64200
Depth of beam in inches	23'	21.94	22.19	22.44	22.68	22.92	23.14	23.36	23.57	23.78	23.99
Breadth of beam in inches		15.51	15.70	15.87	16.04	16.21	16.36	16.52	16.63	16.81	16.94
Sectional area in sup. feet		2.363	2.419	2.473	2.527	2.579	2.630	2.680	2.728	2.777	2.824
Contents in cubic feet		54.35	55.63	56.88	58.10	59.30	60.48	61.63	62.76	63.87	64.96
Weight in lbs.		2446	2505	2560	2615	2669	2722	2773	2824	2874	2923
Breaking-weight per sup. foot in lbs.		107.5	106.3	105.1	104.0	103.2	101.9	100.9	99.99	99.12	98.28
Weight distributed in lbs.		48300	50600	52900	55200	57500	59800	62100	64400	66700	69000
Breaking-weight distributed		51930	53780	55600	57400	59190	60960	62710	64440	66160	67880
Depth of beam in inches	24'	22.65	22.91	23.17	23.42	23.66	23.89	24.12	24.34	24.56	24.76
Breadth of beam in inches		16.02	16.21	16.39	16.56	16.73	16.90	17.06	17.18	17.34	17.50
Sectional area in sup. feet		2.519	2.578	2.636	2.693	2.749	2.803	2.856	2.909	2.960	3.010
Contents in cubic feet		60.45	61.87	63.26	64.63	65.96	67.27	68.55	69.80	71.04	72.25
Weight in lbs.		2720	2784	2847	2908	2968	3027	3085	3141	3197	3252
Breaking-weight per sup. foot in lbs.		108.7	107.4	106.2	105.1	104.0	103.0	102.1	101.1	100.3	99.40
Weight distributed in lbs.		50400	52800	55200	57600	60000	62400	64800	67200	69600	72000
Breaking-weight distributed		54770	56710	58640	60540	62420	64280	66130	67960	69770	71570
Depth of beam in inches	25'	23.35	23.63	23.89	24.15	24.39	24.63	24.87	25.09	25.32	25.53
Breadth of beam in inches		16.51	16.71	16.89	17.08	17.25	17.42	17.59	17.74	17.86	18.05
Sectional area in sup. feet		2.673	2.741	2.802	2.863	2.922	2.979	3.036	3.092	3.146	3.200
Contents in cubic feet		66.95	68.53	70.07	71.57	73.05	74.50	75.92	77.31	78.68	80.02
Weight in lbs.		3013	3084	3153	3221	3287	3353	3416	3479	3541	3601
Breaking-weight per sup. foot in lbs.		109.8	108.5	107.3	106.2	105.1	104.1	103.1	102.2	101.2	100.2
Weight distributed in lbs.		52500	55000	57500	60000	62500	65000	67500	70000	72500	75000
Breaking-weight distributed		57640	59590	61510	63410	65290	67150	69000	70840	72670	74510
Depth of beam in inches	26'	24.05	24.33	24.61	24.87	25.12	25.37	25.61	25.84	26.07	26.29
Breadth of beam in inches		17.01	17.21	17.40	17.59	17.77	17.94	18.11	18.24	18.41	18.58
Sectional area in sup. feet		2.880	2.948	3.014	3.079	3.142	3.205	3.266	3.326	3.385	3.442
Contents in cubic feet		73.85	75.59	77.29	78.95	80.58	82.18	83.74	85.28	86.79	88.27
Weight in lbs.		3324	3402	3478	3553	3626	3698	3769	3838	3905	3972
Breaking-weight per sup. foot in lbs.		110.9	109.6	108.4	107.2	106.2	105.1	104.1	103.2	102.2	101.4
Weight distributed in lbs.		54600	57200	59800	62400	65000	67600	70200	72800	75400	78000
Breaking-weight distributed		60540	62690	64810	66910	68990	71050	73090	75120	77120	79100
Depth of beam in inches	27'	24.74	25.03	25.31	25.58	25.85	26.10	26.35	26.59	26.82	27.05
Breadth of beam in inches		17.50	17.70	17.90	18.09	18.27	18.46	18.63	18.79	18.92	19.10
Sectional area in sup. feet		3.006	3.077	3.146	3.213	3.280	3.345	3.408	3.471	3.532	3.594
Contents in cubic feet		81.16	83.07	84.93	86.76	88.55	90.30	92.02	93.71	95.37	97.00
Weight in lbs.		3652	3738	3822	3904	3985	4064	4141	4217	4292	4365
Breaking-weight per sup. foot in lbs.		112.2	110.9	109.7	108.5	107.4	106.4	105.4	104.4	103.4	102.6
Weight distributed in lbs.		56700	59400	62100	64800	67500	70200	72900	75600	78300	81000
Breaking-weight distributed		63460	65710	67940	70150	72330	74480	76620	78740	80840	82920
Depth of beam in inches	28'	25.42	25.72	26.01	26.29	26.56	26.82	27.08	27.32	27.56	27.80
Breadth of beam in inches		17.96	18.19	18.40	18.59	18.78	18.96	19.14	19.32	19.51	19.68
Sectional area in sup. feet		3.174	3.249	3.322	3.394	3.464	3.532	3.600	3.666	3.730	3.794
Contents in cubic feet		88.68	90.98	93.02	95.02	96.98	98.90	100.7	102.6	104.4	106.2
Weight in lbs.		4000	4094	4186	4276	4366	4455	4541	4627	4711	4793
Breaking-weight per sup. foot in lbs.		113.0	111.6	110.4	109.2	108.1	107.1	106.1	105.1	104.1	103.3
Weight distributed in lbs.		58800	61600	64400	67200	70000	72800	75600	78400	81200	84000
Breaking-weight distributed		66410	68770	71100	73410	75690	77950	80190	82410	84600	86780
Depth of beam in inches	29'	26.10	26.41	26.70	26.99	27.27	27.53	27.80	28.05	28.30	28.54
Breadth of beam in inches		18.46	18.68	18.88	19.09	19.28	19.47	19.65	19.82	20.00	20.14
Sectional area in sup. feet		3.346	3.425	3.502	3.577	3.651	3.716	3.794	3.864	3.932	4.000
Contents in cubic feet		97.03	99.32	101.5	103.7	105.8	107.9	110.0	112.0	114.1	115.9
Weight in lbs.		4367	4460	4550	4638	4724	4809	4891	4971	5051	5129
Breaking-weight per sup. foot in lbs.		114.0	112.6	111.4	110.2	109.1	108.0	107.0	106.0	105.0	104.1
Weight distributed in lbs.		60900	63800	66700	69600	72500	75400	78300	81200	84100	87000
Breaking-weight distributed		68390	71850	74290	76700	79090	81440	83780	86100	88400	90670
Depth of beam in inches	30'	26.77	27.09	27.39	27.70	27.97	28.24	28.51	28.77	29.02	29.27
Breadth of beam in inches		18.93	19.10	19.37	19.58	19.78	19.97	20.14	20.32	20.51	20.65
Sectional area in sup. feet		3.521	3.604	3.684	3.764	3.841	3.918	3.992	4.065	4.138	4.208
Contents in cubic feet		105.6	108.1	110.5	112.9	115.2	117.5	119.7	121.9	124.1	126.2
Weight in lbs.		4733	4855	4974	50.81	5186	5289	5389	5488	5585	5681
Breaking-weight per sup. foot in lbs.		114.9	113.6	112.3	111.1	110.0	108.9	107.9	107.0	106.0	105.1
Weight distributed in lbs.		63000	66000	69000	72000	75000	78000	81000	84000	87000	90000
Breaking-weight distributed		72330	74960	77510	80020	82510	84970	87410	89830	92220	94600

STRENGTH FORMULÆ.

Formulae to be used in the "strength formulae tables" for the breaking-weight and the determination of scantlings of rectangular and uniform section-factor of safety = 10.

	Enter the tables with
Fixed at one end, weight at the other ...	8 W
Fixed at one end, weight uniformly distributed ...	4 W
Fixed at one end, weight in the centre ...	4 W
Supported at both ends, weight in the centre ...	2 W
Supported at both ends, weight uniformly distributed ...	W
	4 W
Fixed at both ends, weight in the centre...	3
	2 W
Fixed at both ends, weight uniformly distributed ...	3
	8 W X Y *
Supported weight not in the centre ...	L ²
	16 W X Y *
Fixed weight not in the centre ...	L ²

For any other factor of safety enter the tables with $\frac{N}{10}$ $\times$ by the above formulae.

Should the weight required, not be found in the tables (which will sometimes happen) for very large structures where a great weight has to be supported, such as railway bridges, then the size of scantling will be found from this rule.

Rule.—Take $\frac{1}{8}$ the weight and find what scantling will support this weight, then multiply the depth of the scantling so found by 2 and, should some other ratio of depth to breadth other than $\sqrt{2}$ be required (and for any timber other than teak) multiply the depth by the co-efficient corresponding to the value of E_d and R for the timber used.

For the inverse problem, when the scantling cannot be found in the tables, namely—

A beam of known dimensions is given, to find the weight it will support:

Divide the depth by 2; find from the tables what weight such a beam will support and multiply the result by 8 (*i.e.*, 2³).

The "Strength tables" are not calculated to decimals of a foot as in the "Deflection formulae tables;" but still, by observing the above two rules, nearly any degree of accuracy may be obtained.

The "Deflection formulae tables" give the rules for breaking-weight by the multiplication of three numbers.

Examples.—See formulae to be used in deflection formulae.

The "Strength formulae" may be found handy for designing "Railway bridges;" but for all lighter structures the "Deflection formulae" should be used, which will give the deflection and the breaking-weight as well, and can be used for structures of a heavier class as well as the "Strength tables."

The total weight is not given in the "tables" direct, but in the "diagram" it will be found opposite the length and under a certain span of beam, or the total weight in pounds is equal to $L \cdot S \times 100$ where L = length of beam in feet and S = distance the beams are apart in feet.

* In the two last quantities given X and Y are the divisions in each side of the beam at which the load is situated and L = the length of the beam in feet.

Table No. IX.—Burma Teak.

Strength Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			1'	2'	3'	4'	5'	6'	7'	8'	9'	10'
Depth of beam	in inches	1	9596	1209	1384	1523	1641	1744	1835	1919	1996	2068
Breadth of beam	in inches		6786	6550	6297	6077	5881	5703	5541	5393	5258	5134
Sectional area	in sup. feet		004523	007179	009407	01139	01322	01493	01655	01809	01957	02099
Contents	in cubic feet		004523	007179	009407	01139	01322	01493	01655	01809	01957	02099
Weight	in lbs.		2035	3230	4233	5128	5950	6719	7448	8140	8805	9446
Deflection	in inches		02672	02121	01853	01683	01562	01470	01397	01336	01285	01240
Weight to deflect	L	40	93.57	117.8	134.9	148.5	160.0	170.0	178.9	187.1	194.6	201.5
Depth of beam	in inches	2	1523	1919	2197	2418	2602	2763	2914	3047	3169	3282
Breadth of beam	in inches		1077	1357	1554	1710	1842	1957	2061	2155	2241	2321
Sectional area	in sup. feet		01139	01809	02370	02872	03332	03763	04170	04559	04931	05290
Contents	in cubic feet		02278	03613	04740	05743	06664	07525	08340	09116	09861	05290
Weight	in lbs.		1025	1628	2134	2584	2998	3386	3753	4103	4437	4760
Deflection	in inches		06733	05344	04663	04241	03937	03705	03519	03366	03237	03125
Weight to deflect	L	40	74.27	93.57	107.1	117.9	127.0	134.9	142.1	148.5	154.5	160.0
Depth of beam	in inches	3	1996	2515	2879	3169	3406	3627	3819	3993	4152	4301
Breadth of beam	in inches		1412	1779	2036	2241	2414	2565	2700	2823	2937	3041
Sectional area	in sup. feet		01957	03179	04070	04931	05722	06461	07161	07827	08467	09083
Contents	in cubic feet		03914	06358	08140	09861	01148	01332	01514	01693	01868	02040
Weight	in lbs.		2641	4193	5495	6666	7724	8682	9566	10382	11143	11856
Deflection	in inches		1156	09176	08016	07283	06760	06362	06043	05780	05583	05366
Weight to deflect	L	40	64.88	81.74	93.57	103.0	110.9	117.9	124.1	129.8	135.0	139.8
Depth of beam	in inches	4	2418	3046	3487	3839	4135	4394	4627	4836	5030	5210
Breadth of beam	in inches		1710	2155	2467	2715	2924	3107	3272	3420	3557	3684
Sectional area	in sup. feet		02872	04550	05973	07236	08397	09482	01051	01149	01233	01303
Contents	in cubic feet		05743	09116	11940	14482	16794	18864	20707	22336	23761	25083
Weight	in lbs.		5169	8205	10755	13022	15111	17077	18911	20627	22236	23749
Deflection	in inches		1697	1347	1176	1069	09922	09337	08869	08493	08156	07857
Weight to deflect	L	40	58.94	74.27	85.01	93.57	100.8	107.1	112.8	117.9	122.6	127.0
Depth of beam	in inches	5	2806	3535	4047	4454	4798	5099	5368	5612	5837	6046
Breadth of beam	in inches		1964	2500	2962	3350	3683	3969	4217	4437	4627	4795
Sectional area	in sup. feet		03897	06138	08043	09744	01131	01277	01415	01547	01673	01795
Contents	in cubic feet		07794	12276	16086	19488	22482	25076	27271	29066	30461	31456
Weight	in lbs.		8700	1381	1800	2192	2544	2857	3133	3374	3580	3754
Deflection	in inches		2284	1813	1584	1439	1336	1257	1194	1142	1098	1060
Weight to deflect	L	40	54.72	68.94	78.92	86.86	93.57	99.43	104.7	109.5	113.8	117.9
Depth of beam	in inches	6	3168	3992	4570	5030	5418	5738	6061	6337	6591	6827
Breadth of beam	in inches		2241	2823	3232	3587	3891	4142	4349	4517	4656	4775
Sectional area	in sup. feet		04931	07827	10255	12243	14000	15541	16900	18100	19161	20083
Contents	in cubic feet		09861	15654	20510	24486	27572	30000	31900	33300	34300	35000
Weight	in lbs.		1331	2113	2799	3354	3892	4416	4927	5427	5916	6394
Deflection	in inches		2913	2312	2011	1835	1703	1603	1523	1456	1401	1352
Weight to deflect	L	40	51.49	64.88	74.27	81.74	88.05	93.57	98.50	103.0	107.1	111.0
Depth of beam	in inches	7	3593	4424	5065	5574	6005	6381	6717	7023	7305	7566
Breadth of beam	in inches		2583	3129	3581	3942	4247	4513	4751	4967	5168	5350
Sectional area	in sup. feet		06056	09013	11960	14907	17854	20801	23748	26695	29642	32589
Contents	in cubic feet		12112	18026	23940	29854	35768	41682	47596	53510	59424	65338
Weight	in lbs.		1907	3028	3968	4807	5578	6298	6969	7590	8161	8682
Deflection	in inches		3578	2833	2461	2254	2092	1969	1870	1789	1720	1661
Weight to deflect	L	40	48.91	61.63	70.54	77.68	83.64	88.88	93.57	97.83	101.7	105.4
Depth of beam	in inches	8	3996	4836	5536	6088	6564	6975	7343	7683	7995	8270
Breadth of beam	in inches		2715	3420	3915	4309	4611	4832	5072	5329	5604	5888
Sectional area	in sup. feet		07236	1149	1505	1823	2116	2394	2658	2909	3147	3375
Contents	in cubic feet		14472	22980	30100	36460	42920	49480	56140	62900	69760	76720
Weight	in lbs.		2605	4135	5418	6564	7617	8601	9523	10382	11187	11938
Deflection	in inches		4275	3393	2964	2693	2500	2352	2236	2138	2055	1985
Weight to deflect	L	40	46.78	58.94	67.47	74.27	80.00	85.01	89.50	93.57	97.31	100.8
Depth of beam	in inches	9	4152	5232	5980	6591	7100	7545	7943	8305	8637	8946
Breadth of beam	in inches		2936	3770	4235	4661	5021	5335	5617	5873	6108	6326
Sectional area	in sup. feet		08407	1344	1761	2134	2476	2796	3098	3387	3663	3930
Contents	in cubic feet		16814	26880	35220	42680	49320	55160	60200	64540	68180	71120
Weight	in lbs.		3429	5443	7132	8640	10033	11324	12544	13703	14812	15881
Deflection	in inches		5002	3970	3476	3151	2925	2753	2615	2501	2405	2322
Weight to deflect	L	40	44.98	56.67	64.88	71.41	76.92	81.74	86.05	89.97	93.57	96.91
Depth of beam	in inches	10	4454	5623	6424	7071	7617	8094	8521	8909	9266	9597
Breadth of beam	in inches		3150	3969	4543	5000	5387	5724	6025	6300	6552	6786
Sectional area	in sup. feet		09743	1547	2027	2435	2819	3177	3517	3839	4146	4432
Contents	in cubic feet		19486	30940	40540	48700	56380	63540	70180	76300	81920	87040
Weight	in lbs.		4384	6959	9120	11054	12811	14414	15887	17239	18481	19623
Deflection	in inches		5756	4569	3991	3526	3168	2870	2628	2437	2297	2197
Weight to deflect	L	40	43.43	54.72	62.64	68.94	74.27	78.92	83.08	86.86	90.34	93.57

Table No. IX.—Burma Teak.

Strength Formulae.

$$P_b = 800$$

$$E_d = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Depth of beam	in inches	1	2'134	2'197	2'256	2'313	2'367	2'418	2'468	2'515	2'561	2'605
Breadth of beam	in inches		1'509	1'554	1'596	1'636	1'674	1'710	1'745	1'779	1'811	1'842
Sectional area	in sup. feet		0'2237	0'2371	0'2500	0'2627	0'2751	0'2872	0'2990	0'3106	0'3220	0'3332
Contents	in cubic feet		0'2237	0'2371	0'2500	0'2627	0'2751	0'2872	0'2990	0'3106	0'3220	0'3332
Weight	in lbs.		1'006	1'067	1'122	1'182	1'237	1'292	1'345	1'397	1'449	1'499
Deflection	in inches		0'1201	0'1167	0'1136	0'1108	0'1083	0'1060	0'1039	0'1020	0'1002	0'09843
Weight to deflect	L — 40		208.1	214.2	220.0	225.5	230.7	237.5	240.6	245.2	249.6	253.9
Depth of beam	in inches	2	3'388	3'487	3'582	3'672	3'757	3'838	3'917	3'993	4'065	4'135
Breadth of beam	in inches		2'396	2'407	2'532	2'596	2'657	2'714	2'770	2'832	2'875	2'914
Sectional area	in sup. feet		0'5637	0'5973	0'6300	0'6620	0'6931	0'7236	0'7534	0'7827	0'8114	0'8397
Contents	in cubic feet		1'128	1'194	1'260	1'323	1'386	1'447	1'507	1'565	1'622	1'679
Weight	in lbs.		5'072	5'375	5'670	5'957	6'238	6'512	6'780	7'044	7'302	7'556
Deflection	in inches		0'3027	0'2941	0'2863	0'2793	0'2730	0'2672	0'2618	0'2569	0'2523	0'2480
Weight to deflect	L — 40		165.1	170.0	174.6	179.0	183.2	187.1	190.9	194.6	198.2	201.6
Depth of beam	in inches	3	4'440	4'570	4'694	4'811	4'923	5'030	5'133	5'232	5'327	5'418
Breadth of beam	in inches		3'140	3'235	3'319	3'402	3'481	3'557	3'630	3'699	3'767	3'832
Sectional area	in sup. feet		0'9679	1'023	1'082	1'137	1'190	1'242	1'294	1'344	1'393	1'442
Contents	in cubic feet		1'903	2'007	2'126	2'245	2'364	2'479	2'591	2'700	2'807	2'912
Weight	in lbs.		13'07	13'84	14'60	15'34	16'06	16'77	17'46	18'14	18'81	19'46
Deflection	in inches		0'5198	0'5050	0'4917	0'4797	0'4688	0'4588	0'4496	0'4411	0'4333	0'4259
Weight to deflect	L — 40		144.3	148.5	152.5	156.4	160.0	163.5	167.1	170.0	173.1	176.1
Depth of beam	in inches	4	5'378	5'537	5'696	5'829	5'964	6'094	6'218	6'338	6'453	6'564
Breadth of beam	in inches		3'803	3'915	4'021	4'121	4'217	4'309	4'397	4'482	4'563	4'641
Sectional area	in sup. feet		1'420	1'505	1'588	1'668	1'747	1'823	1'899	1'972	2'043	2'116
Contents	in cubic feet		2'841	3'011	3'181	3'341	3'496	3'646	3'791	3'931	4'066	4'196
Weight	in lbs.		25'56	27'09	28'58	30'02	31'44	32'82	34'17	35'50	36'80	38'08
Deflection	in inches		0'7629	0'7410	0'7216	0'7039	0'6879	0'6733	0'6598	0'6474	0'6358	0'6250
Weight to deflect	L — 40		131.1	135.0	138.6	142.0	145.4	148.5	151.5	154.4	157.3	160.0
Depth of beam	in inches	5	6'241	6'425	6'598	6'763	6'921	7'071	7'215	7'354	7'488	7'617
Breadth of beam	in inches		4'413	4'543	4'668	4'788	4'894	5'000	5'102	5'200	5'295	5'386
Sectional area	in sup. feet		1'913	2'037	2'158	2'266	2'362	2'456	2'557	2'656	2'753	2'849
Contents	in cubic feet		3'826	4'074	4'346	4'632	4'932	5'246	5'574	5'916	6'272	6'642
Weight	in lbs.		43'03	46'06	49'10	52'13	55'14	58'12	61'07	63'99	66'80	69'50
Deflection	in inches		1'027	0'9978	0'9716	0'9478	0'9263	0'9066	0'8884	0'8717	0'8561	0'8416
Weight to deflect	L — 40		121.7	125.3	128.7	131.9	135.0	137.9	140.7	143.4	146.0	148.5
Depth of beam	in inches	6	7'048	7'255	7'451	7'637	7'815	7'985	8'148	8'306	8'456	8'601
Breadth of beam	in inches		4'984	5'130	5'269	5'401	5'526	5'646	5'762	5'873	5'979	6'082
Sectional area	in sup. feet		2'439	2'584	2'726	2'864	2'999	3'131	3'260	3'386	3'511	3'633
Contents	in cubic feet		4'878	5'168	5'456	5'742	6'026	6'307	6'584	6'857	7'126	7'391
Weight	in lbs.		65'84	69'77	73'60	77'33	80'97	84'53	88'01	91'43	94'79	98'08
Deflection	in inches		1'310	1'272	1'239	1'209	1'181	1'156	1'133	1'111	1'092	1'073
Weight to deflect	L — 46		114.5	117.9	121.1	124.1	127.0	129.7	132.4	135.0	137.4	139.8
Depth of beam	in inches	7	7'810	8'040	8'257	8'464	8'661	8'850	9'030	9'204	9'371	9'533
Breadth of beam	in inches		5'523	5'685	5'839	5'985	6'124	6'257	6'385	6'508	6'626	6'741
Sectional area	in sup. feet		2'895	3'174	3'448	3'718	3'983	4'244	4'500	4'751	4'997	5'239
Contents	in cubic feet		5'790	6'348	6'896	7'442	7'986	8'526	9'061	9'591	10'116	10'636
Weight	in lbs.		94'35	99'97	105'5	110'8	116'0	121'1	126'1	131'0	135'9	140'5
Deflection	in inches		1'609	1'562	1'522	1'484	1'450	1'420	1'391	1'365	1'341	1'318
Weight to deflect	L — 40		108.8	112.0	115.0	117.9	120.6	123.2	125.7	128.2	130.5	132.8
Depth of beam	in inches	8	8'526	8'789	9'036	9'252	9'467	9'673	9'871	10'06	10'24	10'42
Breadth of beam	in inches		6'087	6'215	6'333	6'442	6'546	6'646	6'742	6'834	6'921	7'003
Sectional area	in sup. feet		3'579	3'793	4'001	4'203	4'401	4'595	4'784	4'970	5'152	5'332
Contents	in cubic feet		7'158	7'586	8'012	8'436	8'856	9'272	9'684	10'091	10'494	10'893
Weight	in lbs.		128'9	136'5	144'0	151'3	158'4	165'4	172'2	178'9	185'4	191'9
Deflection	in inches		1'922	1'867	1'818	1'774	1'733	1'696	1'662	1'631	1'602	1'575
Weight to deflect	L — 40		104.1	107.1	110.0	112.8	115.4	117.9	120.3	122.6	124.8	127.0
Depth of beam	in inches	9	9'235	9'507	9'764	10'01	10'24	10'46	10'68	10'88	11'08	11'27
Breadth of beam	in inches		6'530	6'722	6'903	7'077	7'241	7'399	7'550	7'695	7'835	7'970
Sectional area	in sup. feet		4'187	4'438	4'681	4'918	5'142	5'356	5'558	5'751	5'934	6'108
Contents	in cubic feet		8'374	8'876	9'372	9'864	10'352	10'836	11'316	11'791	12'261	12'726
Weight	in lbs.		169'6	179'7	189'5	199'1	208'5	217'7	226'7	235'6	244'1	252'6
Deflection	in inches		2'249	2'185	2'127	2'075	2'028	1'985	1'945	1'908	1'874	1'843
Weight to deflect	L — 40		100.1	103.0	105.8	108.4	110.9	113.3	115.7	117.9	120.0	122.1
Depth of beam	in inches	10	9'907	10'20	10'48	10'74	10'99	11'23	11'45	11'68	11'89	12'09
Breadth of beam	in inches		7'005	7'211	7'406	7'591	7'768	7'937	8'099	8'255	8'405	8'550
Sectional area	in sup. feet		4'819	5'107	5'387	5'660	5'926	6'187	6'442	6'692	6'938	7'179
Contents	in cubic feet		9'638	10'214	10'774	11'329	11'878	12'422	12'961	13'495	14'024	14'548
Weight	in lbs.		216'8	229'8	242'4	254'6	266'6	278'3	289'8	301'1	312'1	323'0
Deflection	in inches		2'588	2'514	2'448	2'388	2'334	2'284	2'239	2'196	2'157	2'120
Weight to deflect	L — 40		96.59	99.43	102.1	104.7	107.1	109.5	111.7	113.8	115.9	117.9

Table No. IX.—Burma Teak.

Strength Formulæ.

$$\begin{aligned} P_b &= 800 \\ E_d &= 3900 \end{aligned}$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Depth of beam	in inches	11'	10'56	10'57	11'16	11'44	11'71	11'96	12'21	12'44	12'67	12'89
Breadth of beam	in inches		7'465	7'685	7'892	8'000	8'278	8'458	8'631	8'796	8'957	9'111
Sectional area	in sup. feet		5'472	5'799	6'117	6'427	6'729	7'025	7'315	7'599	7'876	8'152
Contents	in cubic feet		6'019	6'379	6'728	7'069	7'402	7'727	8'046	8'358	8'665	8'967
Weight	in lbs.		270'8	287'0	302'7	318'1	333'1	347'7	362'0	376'1	390'0	403'5
Deflection	in inches	12'	2'293	2'855	2'780	2'712	2'650	2'594	2'542	2'494	2'450	2'408
Weight to deflect	L — 40		93'57	96'32	98'93	101'4	103'7	106'0	108'2	110'3	112'3	114'2
Depth of beam	in inches		11'19	11'52	11'83	12'12	12'41	12'68	12'93	13'19	13'42	13'65
Breadth of beam	in inches		7'911	8'144	8'365	8'573	8'772	8'963	9'146	9'322	9'492	9'655
Sectional area	in sup. feet		6'020	6'379	6'729	7'069	7'402	7'727	8'046	8'358	8'665	8'967
Contents	in cubic feet	13'	7'375	7'815	8'243	8'661	9'069	9'467	9'858	10'241	10'62	10'98
Weight	in lbs.		331'8	351'7	370'9	388'8	408'1	426'0	443'7	461'7	477'7	494'4
Deflection	in inches		3'233	3'141	3'058	2'983	2'916	2'853	2'796	2'744	2'694	2'649
Weight to deflect	L — 40		90'89	93'57	96'10	98'50	100'8	103'0	105'1	107'1	109'0	110'9
Depth of beam	in inches		11'81	12'15	12'48	12'79	13'08	13'37	13'65	13'91	14'16	14'40
Breadth of beam	in inches	14'	8'344	8'592	8'822	9'042	9'253	9'454	9'647	9'832	10'01	10'19
Sectional area	in sup. feet		6'837	7'246	7'643	8'030	8'404	8'777	9'140	9'494	9'843	10'18
Contents	in cubic feet		8'888	9'419	9'935	10'43	10'93	11'41	11'88	12'34	12'80	13'24
Weight	in lbs.		400'0	423'8	447'0	469'7	491'8	513'4	534'6	555'4	575'8	595'8
Deflection	in inches		3'672	3'567	3'473	3'389	3'312	3'241	3'176	3'116	3'061	3'009
Weight to deflect	L — 40	88'50	91'11	93'57	95'91	98'14	100'3	102'3	104'3	106'2	108'0	
Depth of beam	in inches	15'	12'40	12'76	13'11	13'44	13'75	14'05	14'33	14'61	14'88	15'13
Breadth of beam	in inches		8'767	9'025	9'269	9'500	9'721	9'933	10'14	10'33	10'52	10'70
Sectional area	in sup. feet		7'548	7'998	8'437	8'864	9'281	9'689	1'009	1'048	1'087	1'124
Contents	in cubic feet		10'56	11'20	11'81	12'41	12'99	13'56	14'12	14'67	15'21	15'74
Weight	in lbs.		475'4	503'9	531'5	558'4	584'7	610'4	636'6	660'2	684'5	708'3
Deflection	in inches	16'	4'054	3'938	3'834	3'741	3'656	3'578	3'506	3'440	3'379	3'321
Weight to deflect	L — 40		86'34	88'88	91'29	93'57	95'75	97'83	99'82	101'7	103'6	105'4
Depth of beam	in inches		12'96	13'36	13'73	14'07	14'40	14'71	15'01	15'30	15'58	15'84
Breadth of beam	in inches		9'179	9'450	9'705	9'948	10'18	10'40	10'62	10'82	11'02	11'20
Sectional area	in sup. feet		8'375	8'769	9'250	9'718	1'017	1'062	1'106	1'149	1'191	1'233
Contents	in cubic feet	17'	12'41	13'16	13'87	14'57	15'26	15'93	16'59	17'23	17'87	18'49
Weight	in lbs.		558'5	591'9	624'3	658'9	686'8	717'0	746'6	775'6	804'1	832'1
Deflection	in inches		4'444	4'317	4'204	4'101	4'008	3'922	3'844	3'772	3'704	3'641
Weight to deflect	L — 40		84'38	86'86	89'21	91'44	93'57	95'60	97'56	99'43	101'3	103'0
Depth of beam	in inches		18'	13'55	13'95	14'33	14'69	15'03	15'35	15'67	15'97	16'27
Breadth of beam	in inches	9'383		9'865	10'14	10'39	10'63	10'86	11'08	11'29	11'50	11'70
Sectional area	in sup. feet	9'018		9'557	1'009	1'059	1'109	1'158	1'206	1'252	1'298	1'344
Contents	in cubic feet	14'13		15'29	16'12	16'95	17'75	18'52	19'28	20'03	20'77	21'49
Weight	in lbs.	649'3		688'1	725'8	762'5	798'4	833'5	867'9	901'6	934'7	967'2
Deflection	in inches	19'	4'844	4'705	4'581	4'469	4'368	4'275	4'189	4'110	4'037	3'969
Weight to deflect	L — 40		82'58	85'01	87'31	89'50	91'58	93'57	95'48	97'31	99'09	100'8
Depth of beam	in inches		14'11	14'53	14'92	15'29	15'65	15'99	16'31	16'63	16'93	17'23
Breadth of beam	in inches		9'978	10'21	10'55	10'82	11'07	11'31	11'54	11'76	11'97	12'18
Sectional area	in sup. feet		9'778	1'036	1'093	1'148	1'202	1'255	1'307	1'358	1'407	1'457
Contents	in cubic feet	20'	14'13	15'29	16'12	16'95	17'75	18'52	19'28	20'03	20'77	21'49
Weight	in lbs.		748'0	792'7	836'1	878'4	919'8	960'2	999'9	1'038'	1'077'	1'115'
Deflection	in inches		5'263	5'113	4'979	4'857	4'747	4'646	4'563	4'477	4'397	4'322
Weight to deflect	L — 40		80'93	83'32	85'56	87'70	89'75	91'70	93'57	95'37	97'10	98'73
Depth of beam	in inches		20'	14'66	15'09	15'50	15'89	16'26	16'61	16'95	17'29	17'69
Breadth of beam	in inches	10'37		10'67	10'96	11'23	11'50	11'74	11'99	12'21	12'44	12'65
Sectional area	in sup. feet	1'055		1'118	1'180	1'239	1'298	1'354	1'410	1'465	1'519	1'572
Contents	in cubic feet	16'39		20'12	21'23	22'30	23'35	24'38	25'38	26'37	27'34	28'29
Weight	in lbs.	854'6		905'8	955'3	1'003'	1'051'	1'097'	1'142'	1'186'	1'231'	1'273'
Deflection	in inches	20'	5'687	5'505	5'360	5'229	5'110	5'002	4'902	4'809	4'723	4'643
Weight to deflect	L — 40		79'40	81'74	83'95	86'05	88'05	89'96	91'80	93'57	95'27	96'91
Depth of beam	in inches		15'20	15'64	16'07	16'47	16'85	17'22	17'57	17'91	18'23	18'55
Breadth of beam	in inches		10'75	11'06	11'36	11'65	11'92	12'18	12'43	12'66	12'89	13'12
Sectional area	in sup. feet		1'134	1'202	1'268	1'332	1'394	1'456	1'516	1'575	1'633	1'689
Contents	in cubic feet	20'	21'54	22'83	24'08	25'30	26'49	27'66	28'80	29'92	31'02	32'10
Weight	in lbs.		969'6	1'027'	1'083'	1'138'	1'192'	1'245'	1'296'	1'346'	1'395'	1'444'
Deflection	in inches		6'091	5'917	5'761	5'620	5'493	5'376	5'268	5'169	5'076	4'990
Weight to deflect	L — 40		77'98	80'28	82'45	84'51	86'48	88'36	90'16	91'90	93'57	95'18
Depth of beam	in inches		20'	15'73	16'19	16'63	17'04	17'44	17'82	18'18	18'52	18'87
Breadth of beam	in inches	11'12		11'45	11'76	12'05	12'33	12'60	12'86	13'11	13'34	13'57
Sectional area	in sup. feet	1'214		1'287	1'357	1'426	1'493	1'559	1'623	1'686	1'748	1'809
Contents	in cubic feet	24'29		25'74	27'15	28'52	29'86	31'18	32'46	33'72	34'96	36'18
Weight	in lbs.	1'093'		1'158'	1'221'	1'283'	1'344'	1'403'	1'461'	1'518'	1'575'	1'632'
Deflection	in inches	20'	6'523	6'336	6'169	6'019	5'882	5'757	5'641	5'535	5'436	5'344
Weight to deflect	L — 40		76'66	78'92	81'05	83'08	85'01	86'86	88'63	90'34	91'98	93'57

Table No. IX.—Burma Teak.

Strength Formulæ.

$$\begin{aligned} P_b &= 800 \\ E_d &= 3900 \end{aligned}$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre= <i>S</i> .									
			21'	22'	23'	24'	25'	26'	27'	28'	29'	30'
Depth of beam	in inches	11'	13.10	13.30	13.50	13.69	13.88	14.06	14.24	14.42	14.58	14.75
Breadth of beam	in inches		9.261	9.405	9.545	9.691	9.814	9.944	10.07	10.19	10.31	10.43
Sectional area	in sup. feet		.8421	.8687	.8949	.9206	.9459	.9710	.9957	1.020	1.044	1.068
Contents	in cubic feet		9.263	9.555	9.843	10.12	10.40	10.68	10.95	11.23	11.49	11.75
Weight	in lbs.		416.8	429.9	442.9	455.6	468.2	480.6	492.8	505.0	516.9	528.7
Deflection	in inches		.2369	.2333	.2298	.2266	.2235	.2206	.2179	.2152	.2127	.2103
Weight to deflect	L — 40		116.1	117.9	119.6	121.4	123.0	124.6	126.2	127.7	129.2	130.7
Depth of beam	in inches	12'	13.88	14.09	14.29	14.51	14.71	14.90	15.09	15.27	15.46	15.63
Breadth of beam	in inches		9.814	9.967	10.12	10.26	10.40	10.54	10.67	10.80	10.93	11.05
Sectional area	in sup. feet		.9264	.9555	.9843	1.013	1.040	1.068	1.095	1.122	1.149	1.175
Contents	in cubic feet		11.34	11.70	12.06	12.40	12.74	13.08	13.41	13.75	14.07	14.39
Weight	in lbs.		510.7	526.8	542.6	558.2	573.6	588.9	603.8	618.7	633.3	647.8
Deflection	in inches		.2606	.2566	.2528	.2493	.2459	.2427	.2397	.2368	.2340	.2314
Weight to deflect	L — 40		112.8	114.5	116.2	117.9	119.5	121.1	122.6	124.1	125.5	127.0
Depth of beam	in inches	13'	14.64	14.87	15.09	15.31	15.52	15.71	15.89	16.11	16.30	16.49
Breadth of beam	in inches		10.35	10.51	10.67	10.82	10.97	11.12	11.26	11.39	11.53	11.66
Sectional area	in sup. feet		1.052	1.085	1.118	1.150	1.182	1.213	1.244	1.275	1.305	1.335
Contents	in cubic feet		13.98	14.10	14.53	14.95	15.36	15.77	16.17	16.57	16.96	17.35
Weight	in lbs.		615.5	634.9	654.0	672.8	691.4	709.7	727.6	745.6	763.3	780.7
Deflection	in inches		.2960	.2915	.2872	.2831	.2793	.2757	.2723	.2690	.2658	.2628
Weight to deflect	L — 40		109.8	111.5	113.2	114.8	116.4	117.9	119.4	120.8	122.2	123.6
Depth of beam	in inches	14'	15.38	15.62	15.85	16.08	16.30	16.51	16.72	16.93	17.13	17.32
Breadth of beam	in inches		10.88	11.05	11.21	11.37	11.53	11.68	11.83	11.97	12.11	12.25
Sectional area	in sup. feet		1.161	1.198	1.234	1.270	1.305	1.339	1.373	1.407	1.440	1.473
Contents	in cubic feet		16.26	16.77	17.27	17.77	18.26	18.74	19.22	19.70	20.16	20.62
Weight	in lbs.		731.7	754.7	777.5	799.9	821.9	843.6	865.2	886.4	907.4	928.1
Deflection	in inches		.3368	.3218	.3170	.3125	.3083	.3043	.3005	.2969	.2934	.2902
Weight to deflect	L — 40		107.1	108.8	110.4	112.0	113.5	115.0	116.5	117.9	119.3	120.6
Depth of beam	in inches	15'	16.10	16.36	16.60	16.84	17.07	17.29	17.51	17.72	17.93	18.14
Breadth of beam	in inches		11.39	11.57	11.74	11.91	12.07	12.23	12.38	12.54	12.68	12.83
Sectional area	in sup. feet		1.273	1.313	1.353	1.392	1.430	1.468	1.506	1.543	1.579	1.615
Contents	in cubic feet		19.11	19.70	20.29	20.83	21.45	22.02	22.58	23.14	23.68	24.22
Weight	in lbs.		859.5	886.6	913.3	939.6	965.5	991.0	1017.	1041.	1066.	1090.
Deflection	in inches		.3588	.3528	.3476	.3427	.3380	.3336	.3295	.3255	.3217	.3181
Weight to deflect	L — 40		104.7	106.3	107.1	109.4	110.9	112.4	113.8	115.2	116.5	117.9
Depth of beam	in inches	16'	16.81	17.08	17.33	17.58	17.82	18.05	18.28	18.50	18.72	18.94
Breadth of beam	in inches		11.89	12.07	12.26	12.43	12.60	12.77	12.93	13.08	13.24	13.39
Sectional area	in sup. feet		1.388	1.431	1.475	1.517	1.559	1.600	1.641	1.681	1.721	1.760
Contents	in cubic feet		22.20	22.90	23.59	24.27	24.94	25.60	26.25	26.90	27.55	28.16
Weight	in lbs.		999.2	1031.	1062.	1092.	1123.	1152.	1181.	1210.	1239.	1267.
Deflection	in inches		.3904	.3844	.3788	.3735	.3684	.3636	.3591	.3547	.3506	.3467
Weight to deflect	L — 40		103.4	104.1	105.6	107.1	108.6	110.0	111.4	112.8	114.1	115.4
Depth of beam	in inches	17'	17.51	17.78	18.05	18.31	18.55	18.80	19.03	19.27	19.50	19.72
Breadth of beam	in inches		12.38	12.57	12.76	12.94	13.12	13.29	13.46	13.63	13.79	13.94
Sectional area	in sup. feet		1.505	1.552	1.599	1.645	1.690	1.735	1.779	1.823	1.866	1.909
Contents	in cubic feet		25.58	26.37	27.18	27.96	28.73	29.49	30.24	30.99	31.72	32.50
Weight	in lbs.		1151.	1187.	1223.	1258.	1293.	1327.	1361.	1394.	1427.	1460.
Deflection	in inches		.4252	.4187	.4126	.4068	.4013	.3961	.3911	.3864	.3819	.3776
Weight to deflect	L — 40		100.4	102.0	103.5	104.9	106.4	107.8	109.2	110.5	111.8	113.0
Depth of beam	in inches	18'	18.19	18.47	18.74	19.01	19.27	19.53	19.77	20.02	20.25	20.48
Breadth of beam	in inches		12.80	13.06	13.26	13.44	13.60	13.81	13.98	14.15	14.32	14.47
Sectional area	in sup. feet		1.624	1.675	1.725	1.775	1.824	1.872	1.920	1.967	2.014	2.060
Contents	in cubic feet		29.22	30.14	31.05	31.95	32.83	33.70	34.56	35.40	36.24	37.07
Weight	in lbs.		1316.	1356.	1397.	1437.	1477.	1516.	1555.	1593.	1631.	1668.
Deflection	in inches		.4568	.4498	.4432	.4370	.4310	.4254	.4201	.4151	.4102	.4056
Weight to deflect	L — 40		98.50	100.1	101.6	103.0	104.4	105.8	107.1	108.4	109.7	110.9
Depth of beam	in inches	19'	18.85	19.15	19.43	19.71	19.98	20.24	20.50	20.75	20.90	21.24
Breadth of beam	in inches		13.33	13.54	13.75	13.94	14.13	14.31	14.50	14.68	14.85	15.02
Sectional area	in sup. feet		1.745	1.800	1.854	1.908	1.960	2.012	2.064	2.114	2.164	2.214
Contents	in cubic feet		33.16	34.20	35.23	36.24	37.24	38.23	39.20	40.17	41.12	42.06
Weight	in lbs.		1462.	1539.	1585.	1631.	1676.	1720.	1764.	1808.	1850.	1893.
Deflection	in inches		.4910	.4834	.4764	.4696	.4633	.4573	.4516	.4461	.4409	.4360
Weight to deflect	L — 40		96.74	98.25	99.72	101.0	102.5	103.9	105.2	106.5	107.7	109.0
Depth of beam	in inches	20'	19.51	19.81	20.11	20.40	20.67	20.95	21.22	21.47	21.72	21.97
Breadth of beam	in inches		13.80	14.01	14.22	14.43	14.62	14.81	15.00	15.18	15.36	15.54
Sectional area	in sup. feet		1.873	1.928	1.981	2.033	2.089	2.155	2.210	2.264	2.318	2.371
Contents	in cubic feet		37.38	38.55	39.71	40.86	41.98	43.09	44.19	45.28	46.35	47.41
Weight	in lbs.		1682.	1765.	1787.	1838.	1889.	1939.	1988.	2038.	2083.	2134.
Deflection	in inches		.5258	.5177	.5101	.5029	.4961	.4896	.4835	.4777	.4721	.4668
Weight to deflect	L — 40		95.10	96.59	98.03	99.43	100.8	102.1	103.4	104.7	105.9	10

Table No. IX.—Burma Teak.

Strength Formulae.

$$\frac{P_b}{E_s} = 800$$

$$\frac{E_s}{E_s} = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.	Length of beam (feet).	Distance of beams apart—centre to centre=S.									
		1'	2'	3'	4'	5'	6'	7'	8'	9'	10'
Depth of beam in inches	21'	7.305	9.203	10.54	11.60	12.49	13.29	13.97	14.61	15.20	15.74
Breadth of beam in inches		5.166	6.508	7.450	8.199	8.832	9.386	9.881	10.33	10.74	11.13
Sectional area in sup. feet		2620	4160	5450	6603	7662	8632	9588	10488	11334	12126
Contents in cubic feet		5.502	8.734	11.44	13.86	16.09	18.16	20.13	22.01	23.80	25.54
Weight in lbs.	21'	247.6	393.0	515.0	623.9	724.0	817.6	901.6	980.4	1071.1	1149.0
Deflection in inches		1.548	1.220	1.073	.9752	.9053	.8519	.8062	.7740	.7442	.7185
Weight to deflect		40	33.91	42.73	48.91	53.84	57.99	61.63	64.88	67.83	70.50
Weight to deflect		40	33.91	42.73	48.91	53.84	57.99	61.63	64.88	67.83	70.50
Depth of beam in inches	22'	7.585	9.493	10.87	11.96	12.88	13.69	14.41	15.07	15.67	16.23
Breadth of beam in inches		5.338	6.713	7.685	8.458	9.111	9.682	10.19	10.66	11.08	11.48
Sectional area in sup. feet		2788	4425	5799	7025	8152	9205	1019	1115	1206	1294
Contents in cubic feet		6.133	9.735	12.78	15.46	17.93	20.25	22.44	24.58	26.53	28.46
Weight in lbs.	22'	275.9	438.1	574.0	695.4	807.0	911.2	1010	1108	1194	1281
Deflection in inches		1.647	1.307	1.142	1.037	.9632	.9104	.8610	.8255	.7918	.7645
Weight to deflect		40	33.39	42.07	48.16	53.01	57.10	60.68	63.88	66.79	69.46
Weight to deflect		40	33.39	42.07	48.16	53.01	57.10	60.68	63.88	66.79	69.46
Depth of beam in inches	23'	7.761	9.779	11.09	12.32	13.29	14.10	14.85	15.52	16.15	16.72
Breadth of beam in inches		5.489	6.915	7.915	8.712	9.385	9.973	10.50	10.98	11.42	11.82
Sectional area in sup. feet		2958	4695	6153	7454	8650	9768	10832	11852	12826	13754
Contents in cubic feet		6.804	10.80	14.15	17.14	19.89	22.46	24.89	27.21	29.43	31.58
Weight in lbs.	23'	306.1	486.0	636.8	771.5	895.2	1010	1130	1255	1385	1511
Deflection in inches		1.748	1.387	1.212	1.101	1.022	.9618	.9136	.8788	.8462	.8152
Weight to deflect		40	32.00	41.45	47.45	52.23	56.26	59.79	62.94	65.80	68.44
Weight to deflect		40	32.00	41.45	47.45	52.23	56.26	59.79	62.94	65.80	68.44
Depth of beam in inches	24'	7.985	10.07	11.52	12.67	13.65	14.51	15.27	15.97	16.61	17.20
Breadth of beam in inches		5.646	7.114	8.144	8.963	9.655	10.26	10.80	11.29	11.74	12.17
Sectional area in sup. feet		3131	4970	6513	7890	9155	10314	11368	12326	13197	14082
Contents in cubic feet		7.514	11.92	15.63	18.93	21.97	24.81	27.49	30.05	32.51	34.87
Weight in lbs.	24'	339.1	539.7	703.3	852.0	988.7	1116	1237	1353	1463	1569
Deflection in inches		1.850	1.468	1.283	1.165	1.082	1.018	.9669	.9248	.8892	.8586
Weight to deflect		40	32.44	40.87	46.78	51.49	55.47	58.94	62.05	64.88	67.47
Weight to deflect		40	32.44	40.87	46.78	51.49	55.47	58.94	62.05	64.88	67.47
Depth of beam in inches	25'	8.205	10.33	11.83	13.02	14.03	14.91	15.69	16.41	17.07	17.68
Breadth of beam in inches		5.802	7.310	8.368	9.210	9.921	10.54	11.10	11.60	12.07	12.50
Sectional area in sup. feet		3306	5248	6877	8381	9667	10832	11897	12872	13757	14552
Contents in cubic feet		8.265	13.12	17.99	20.82	24.16	27.20	30.24	33.06	35.76	38.36
Weight in lbs.	25'	371.9	590.4	773.6	937.2	1087	1238	1381	1517	1649	1776
Deflection in inches		1.953	1.550	1.354	1.230	1.142	1.075	1.021	.9706	.9390	.9066
Weight to deflect		40	32.00	40.92	46.15	50.80	54.72	58.15	61.21	64.80	67.94
Weight to deflect		40	32.00	40.92	46.15	50.80	54.72	58.15	61.21	64.80	67.94
Depth of beam in inches	26'	8.422	10.61	12.15	13.37	14.40	15.26	16.00	16.68	17.32	17.91
Breadth of beam in inches		5.956	7.504	8.590	9.454	10.19	10.82	11.39	11.91	12.39	12.83
Sectional area in sup. feet		3483	5520	7245	8777	10108	11236	12161	12983	13712	14350
Contents in cubic feet		9.052	14.37	18.84	22.82	26.82	30.24	33.69	36.98	40.18	43.23
Weight in lbs.	26'	407.5	646.9	847.6	1026	1191	1345	1491	1630	1763	1891
Deflection in inches		2.058	1.633	1.427	1.296	1.203	1.132	1.076	1.029	.9893	.9596
Weight to deflect		40	31.58	39.81	45.55	50.14	54.01	57.39	60.42	63.17	65.70
Weight to deflect		40	31.58	39.81	45.55	50.14	54.01	57.39	60.42	63.17	65.70
Depth of beam in inches	27'	8.637	10.88	12.46	13.71	14.77	15.69	16.52	17.27	17.97	18.61
Breadth of beam in inches		6.107	7.695	8.809	9.695	10.45	11.16	11.82	12.42	12.97	13.46
Sectional area in sup. feet		3633	5815	7620	9231	1071	1210	1341	1455	1555	1644
Contents in cubic feet		10.30	15.70	20.57	24.92	28.92	32.65	36.19	39.56	42.79	45.90
Weight in lbs.	27'	445.0	706.5	925.8	1121	1301	1469	1628	1780	1925	2066
Deflection in inches		2.164	1.718	1.500	1.363	1.266	1.191	1.132	1.082	1.041	1.004
Weight to deflect		40	31.19	39.30	44.98	49.51	53.33	56.67	59.67	62.38	64.88
Weight to deflect		40	31.19	39.30	44.98	49.51	53.33	56.67	59.67	62.38	64.88
Depth of beam in inches	28'	8.850	11.15	12.76	14.05	15.13	16.09	16.93	17.70	18.40	19.07
Breadth of beam in inches		6.358	7.984	9.025	9.933	10.70	11.37	11.97	12.52	13.02	13.48
Sectional area in sup. feet		3843	6104	7999	9690	1124	1270	1407	1538	1664	1785
Contents in cubic feet		10.77	17.09	22.39	27.13	31.48	35.55	39.40	43.07	46.58	49.97
Weight in lbs.	28'	484.5	769.2	1007	1221	1416	1600	1773	1938	2096	2249
Deflection in inches		2.272	1.803	1.575	1.431	1.329	1.250	1.187	1.136	1.092	1.055
Weight to deflect		40	30.81	38.82	44.44	48.91	52.69	55.99	58.94	61.63	64.10
Weight to deflect		40	30.81	38.82	44.44	48.91	52.69	55.99	58.94	61.63	64.10
Depth of beam in inches	29'	9.059	11.41	13.06	14.38	15.49	16.46	17.33	18.11	18.84	19.52
Breadth of beam in inches		6.466	8.071	9.239	10.17	10.95	11.64	12.25	12.81	13.33	13.80
Sectional area in sup. feet		4090	6396	8382	1015	1178	1330	1475	1612	1744	1871
Contents in cubic feet		11.68	18.35	24.30	29.45	34.17	38.58	42.76	46.74	50.56	54.24
Weight in lbs.	29'	525.8	824.7	1093	1325	1537	1736	1924	2103	2276	2445
Deflection in inches		2.381	1.900	1.651	1.500	1.391	1.310	1.244	1.190	1.144	1.105
Weight to deflect		40	30.45	38.37	43.92	48.34	52.08	55.34	58.26	60.91	63.35
Weight to deflect		40	30.45	38.37	43.92	48.34	52.08	55.34	58.26	60.91	63.35
Depth of beam in inches	30'	9.265	11.67	13.36	14.70	15.84	16.83	17.72	18.53	19.27	19.96
Breadth of beam in inches		6.583	8.255	9.450	10.40	11.20	11.91	12.53	13.10	13.63	14.11
Sectional area in sup. feet		4216	6602	8769	1062	1233	1392	1549	1706	1854	1997
Contents in cubic feet		12.64	20.07	26.81	31.86	36.98	41.75	46.27	50.59	54.72	58.70
Weight in lbs.	30'	563.1	903.3	1184	1434	1664	1879	2082	2276	2462	2641
Deflection in inches		2.491	1.977	1.727	1.569	1.457	1.371	1.302	1.245	1.197	1.156
Weight to deflect		40	30.11	37.94	43.43	47.80	51.49	54.72	57.60	60.23	62.64
Weight to deflect		40	30.11	37.94	43.43	47.80	51.49	54.72	57.60	60.23	62.64

Table No. IX.—Burma Teak.

Strength Formulae.

$$\frac{P_b}{E_s} = 800$$

$$\frac{E_s}{E_s} = 3900$$

$$\frac{d}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre=S.									
			11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Depth of beam	in inches	21'	16.25	16.72	17.18	17.61	18.02	18.41	18.76	19.15	19.49	19.83
Breadth of beam	in inches		11.49	11.83	12.15	12.45	12.74	13.02	13.28	13.54	13.78	14.02
Sectional area	in sup. feet		1.296	1.373	1.449	1.522	1.594	1.664	1.732	1.800	1.866	1.931
Contents	in cubic feet		27.21	28.85	30.42	31.96	33.46	34.93	36.38	37.79	39.18	40.54
Weight	in lbs.	21'	1225	1298	1372	1438	1506	1572	1637	1700	1763	1824
Deflection	in inches		.6961	.6793	.6594	.6423	.6277	.6144	.6020	.5907	.5801	.5703
Weight to deflect	L — 40		75.43	77.65	79.74	81.74	83.64	85.46	87.20	88.88	90.50	92.06
Depth of beam	in inches		22'	16.76	17.25	17.72	18.16	18.59	18.99	19.38	19.75	20.11
Breadth of beam	in inches	11.85		12.20	12.52	12.84	13.14	13.43	13.70	13.96	14.22	14.46
Sectional area	in sup. feet	1.379		1.461	1.541	1.619	1.696	1.770	1.843	1.915	1.985	2.054
Contents	in cubic feet	30.33		32.14	33.90	35.62	37.30	38.94	40.54	42.12	43.67	45.19
Weight	in lbs.	22'	1365	1446	1525	1603	1678	1752	1824	1895	1965	2033
Deflection	in inches		.7406	.7194	.7005	.6834	.6678	.6536	.6405	.6284	.6172	.6068
Weight to deflect	L — 40		74.27	76.45	78.52	80.48	82.36	84.15	85.86	87.51	89.11	90.64
Depth of beam	in inches		23'	17.26	17.77	18.25	18.71	19.14	19.56	19.96	20.34	20.72
Breadth of beam	in inches	12.21		12.57	12.91	13.23	13.54	13.83	14.11	14.39	14.65	14.90
Sectional area	in sup. feet	1.463		1.551	1.635	1.718	1.799	1.878	1.956	2.032	2.106	2.180
Contents	in cubic feet	33.66		35.66	37.61	39.52	41.38	43.20	44.98	46.73	48.44	50.13
Weight	in lbs.	23'	1514	1604	1692	1779	1863	1944	2024	2102	2180	2256
Deflection	in inches		.7858	.7634	.7433	.7252	.7086	.6936	.6797	.6669	.6550	.6438
Weight to deflect	L — 40		73.17	75.33	77.36	79.30	81.14	82.91	84.60	86.23	87.79	89.31
Depth of beam	in inches		24'	17.76	18.28	18.77	19.24	19.69	20.12	20.53	20.93	21.31
Breadth of beam	in inches	12.51		12.93	13.28	13.61	13.92	14.23	14.52	14.80	15.07	15.33
Sectional area	in sup. feet	1.548		1.641	1.731	1.819	1.904	1.988	2.070	2.150	2.229	2.307
Contents	in cubic feet	37.16		39.38	41.54	43.64	45.70	47.71	49.68	51.60	53.50	55.36
Weight	in lbs.	24'	1672	1772	1869	1964	2056	2147	2235	2322	2407	2491
Deflection	in inches		.8317	.8079	.7867	.7675	.7500	.7340	.7194	.7055	.6932	.6814
Weight to deflect	L — 40		72.14	74.27	76.27	78.18	80.00	81.74	83.41	85.01	86.56	88.05
Depth of beam	in inches		25'	18.25	18.79	19.30	19.78	20.24	20.67	21.10	21.51	21.90
Breadth of beam	in inches	12.90		13.28	13.64	13.98	14.31	14.62	14.92	15.21	15.49	15.75
Sectional area	in sup. feet	1.635		1.733	1.828	1.920	2.011	2.100	2.188	2.271	2.354	2.436
Contents	in cubic feet	40.88		43.32	45.69	48.01	50.27	52.48	54.64	56.76	58.85	60.93
Weight	in lbs.	25'	1839	1949	2056	2165	2269	2361	2450	2534	2618	2701
Deflection	in inches		.8782	.8531	.8307	.8104	.7920	.7751	.7596	.7453	.7320	.7195
Weight to deflect	L — 40		71.17	73.26	75.24	77.12	78.92	80.63	82.28	83.86	85.39	86.86
Depth of beam	in inches		26'	18.73	19.29	19.81	20.31	20.77	21.23	21.66	22.07	22.47
Breadth of beam	in inches	13.25		13.64	14.00	14.36	14.69	15.01	15.32	15.61	15.89	16.16
Sectional area	in sup. feet	1.723		1.826	1.926	2.023	2.118	2.212	2.303	2.392	2.480	2.567
Contents	in cubic feet	44.79		47.46	50.06	52.64	55.09	57.50	59.87	62.19	64.46	66.72
Weight	in lbs.	26'	2015	2136	2253	2367	2478	2587	2694	2798	2898	3001
Deflection	in inches		.9260	.8989	.8752	.8538	.8344	.8167	.8003	.7852	.7712	.7581
Weight to deflect	L — 40		70.24	72.31	74.27	76.12	77.90	79.59	81.21	82.78	84.28	85.73
Depth of beam	in inches		27'	19.21	19.78	20.31	20.82	21.30	21.76	22.20	22.64	23.05
Breadth of beam	in inches	13.58		13.98	14.35	14.72	15.06	15.39	15.71	16.01	16.30	16.58
Sectional area	in sup. feet	1.812		1.920	2.026	2.128	2.228	2.326	2.422	2.516	2.608	2.699
Contents	in cubic feet	48.92		51.84	54.68	57.45	60.15	62.80	65.39	67.93	70.43	72.87
Weight	in lbs.	27'	2201	2332	2461	2585	2707	2826	2942	3056	3169	3279
Deflection	in inches		.9731	.9453	.9204	.8980	.8775	.8589	.8417	.8258	.8110	.7973
Weight to deflect	L — 40		69.36	71.41	73.34	75.17	76.92	78.59	80.20	81.74	83.23	84.66
Depth of beam	in inches		28'	19.68	20.26	20.81	21.33	21.83	22.30	22.76	23.19	23.61
Breadth of beam	in inches	13.92		14.33	14.71	15.08	15.43	15.80	16.09	16.40	16.70	16.99
Sectional area	in sup. feet	1.902		2.016	2.126	2.233	2.339	2.442	2.542	2.641	2.738	2.833
Contents	in cubic feet	53.25		56.44	59.53	62.54	65.49	68.37	71.19	73.95	76.67	79.33
Weight	in lbs.	28'	2306	2539	2678	2814	2947	3077	3203	3327	3450	3570
Deflection	in inches		1.022	.9923	.9662	.9426	.9212	.9016	.8835	.8669	.8514	.8370
Weight to deflect	L — 40		68.53	70.54	71.61	74.27	75.99	77.65	79.23	80.75	82.23	83.64
Depth of beam	in inches		29'	20.15	20.74	21.30	21.84	22.34	22.83	23.29	23.74	24.17
Breadth of beam	in inches	14.25		14.67	15.06	15.44	15.80	16.14	16.48	16.79	17.10	17.39
Sectional area	in sup. feet	1.993		2.112	2.228	2.341	2.451	2.559	2.664	2.768	2.869	2.969
Contents	in cubic feet	57.80		61.25	64.61	67.83	70.92	73.86	76.76	79.62	82.41	85.10
Weight	in lbs.	29'	2601	2756	2907	3054	3198	3339	3476	3611	3744	3874
Deflection	in inches		1.070	1.040	1.013	.9877	.9653	.9448	.9250	.9064	.8892	.8730
Weight to deflect	L — 40		67.73	69.72	72.45	73.40	75.11	76.74	78.31	79.81	81.27	82.67
Depth of beam	in inches		30'	20.61	21.21	21.78	22.34	22.85	23.35	23.83	24.28	24.73
Breadth of beam	in inches	14.57		15.00	15.41	15.79	16.16	16.51	16.85	17.17	17.49	17.79
Sectional area	in sup. feet	2.085		2.210	2.332	2.449	2.564	2.677	2.787	2.893	2.995	3.095
Contents	in cubic feet	62.55		66.29	69.92	73.46	76.92	80.33	83.61	86.86	90.05	93.18
Weight	in lbs.	30'	2814	2983	3146	3305	3461	3613	3761	3906	4048	4193
Deflection	in inches		1.120	1.088	1.059	1.033	1.010	.9884	.9686	.9503	.9334	.9175
Weight to deflect	L — 40		66.97	68.94	70.81	72.58	74.27	75.88	77.43	78.92	80.35	81.74

Table No. IX.—Burma Teak.

Strength Formulæ.

$$\frac{P_b}{E_a} = \frac{800}{3900}$$

$$\frac{a}{b} = \sqrt{2}$$

Nature of calculation.		Length of beam (feet).	Distance of beams apart—centre to centre—S.									
			21'	22'	23'	24'	25'	26'	27'	28'	29'	30'
Depth of beam	in inches	21'	20.16	20.47	20.77	21.07	21.36	21.64	21.92	22.18	22.44	22.70
Breadth of beam	in inches		14.25	14.48	14.69	14.91	15.11	15.31	15.50	15.69	15.87	16.05
Sectional area	in sup. feet		1.994	2.057	2.119	2.180	2.240	2.299	2.358	2.416	2.473	2.530
Contents	in cubic feet		41.88	43.20	44.50	45.78	47.04	48.29	49.52	50.74	51.94	53.12
Weight	in lbs.		1884	1944	2002	2060	2117	2173	2229	2283	2337	2390
Deflection	in inches	22'	.5611	.5625	.5443	.5367	.5294	.5226	.5160	.5098	.5039	.4982
Weight to deflect	L		93.57	95.03	96.45	97.83	99.17	100.4	101.7	103.0	104.2	105.4
Depth of beam	in inches		20.79	21.12	21.43	21.73	22.03	22.32	22.60	22.88	23.15	23.41
Breadth of beam	in inches		14.70	14.93	15.15	15.37	15.58	15.78	15.99	16.17	16.37	16.55
Sectional area	in sup. feet		2.122	2.189	2.255	2.320	2.384	2.447	2.509	2.571	2.632	2.704
Contents	in cubic feet	23'	46.68	48.15	49.60	51.03	52.43	53.82	55.19	56.55	57.89	59.21
Weight	in lbs.		2100	2166	2232	2299	2365	2432	2498	2564	2630	2696
Deflection	in inches		.5970	.5878	.5791	.5710	.5633	.5560	.5490	.5424	.5361	.5301
Weight to deflect	L		92.13	93.57	94.97	96.32	97.64	98.93	100.2	101.4	102.6	103.7
Depth of beam	in inches		21.41	21.75	22.07	22.39	22.69	22.99	23.29	23.57	23.85	24.12
Breadth of beam	in inches	24'	15.14	15.38	15.62	15.84	16.05	16.26	16.47	16.67	16.87	17.06
Sectional area	in sup. feet		2.252	2.322	2.393	2.450	2.529	2.596	2.662	2.728	2.792	2.856
Contents	in cubic feet		51.79	53.42	55.02	56.61	58.17	59.71	61.24	62.74	64.22	65.69
Weight	in lbs.		2330	2403	2476	2547	2617	2687	2755	2823	2890	2956
Deflection	in inches		.6423	.6237	.6145	.6059	.5977	.5899	.5826	.5755	.5688	.5625
Weight to deflect	L	25'	90.75	92.19	93.57	94.90	96.20	97.47	98.70	99.91	101.1	102.2
Depth of beam	in inches		22.03	22.38	22.71	23.04	23.35	23.65	23.96	24.25	24.53	24.81
Breadth of beam	in inches		15.58	15.82	16.06	16.29	16.51	16.73	16.94	17.15	17.35	17.55
Sectional area	in sup. feet		2.383	2.458	2.532	2.605	2.677	2.747	2.818	2.887	2.955	3.023
Contents	in cubic feet		57.19	58.99	60.77	62.52	64.24	65.94	67.62	69.28	70.92	72.54
Weight	in lbs.	26'	2573	2655	2734	2813	2891	2967	3043	3118	3192	3264
Deflection	in inches		.6704	.6601	.6504	.6413	.6326	.6244	.6166	.6091	.6020	.5953
Weight to deflect	L		89.50	90.89	92.25	93.57	94.85	96.10	97.31	98.50	99.66	100.8
Depth of beam	in inches		22.64	22.99	23.34	23.67	23.99	24.31	24.62	24.92	25.21	25.50
Breadth of beam	in inches		16.01	16.26	16.50	16.74	16.97	17.19	17.41	17.62	17.83	18.04
Sectional area	in sup. feet	27'	2.516	2.596	2.674	2.751	2.827	2.901	2.975	3.048	3.121	3.192
Contents	in cubic feet		62.91	64.89	66.84	68.77	70.66	72.53	74.38	76.21	78.01	79.79
Weight	in lbs.		2831	2920	3008	3094	3180	3264	3347	3429	3510	3590
Deflection	in inches		.7080	.6971	.6868	.6771	.6670	.6563	.6451	.6332	.6207	.6086
Weight to deflect	L		88.29	89.66	91.00	92.30	93.57	94.80	96.00	97.17	98.32	99.43
Depth of beam	in inches	28'	23.24	23.60	23.95	24.30	24.63	24.95	25.27	25.58	25.88	26.17
Breadth of beam	in inches		16.43	16.69	16.94	17.18	17.42	17.64	17.87	18.09	18.30	18.51
Sectional area	in sup. feet		2.651	2.735	2.817	2.898	2.978	3.057	3.135	3.212	3.288	3.363
Contents	in cubic feet		68.93	71.10	73.24	75.35	77.43	79.47	81.50	83.50	85.48	87.43
Weight	in lbs.		3101	3199	3295	3390	3484	3576	3667	3757	3846	3934
Deflection	in inches	29'	.7459	.7344	.7236	.7134	.7038	.6946	.6860	.6777	.6698	.6623
Weight to deflect	L		87.14	88.50	89.84	91.11	92.35	93.57	94.75	95.91	97.04	98.14
Depth of beam	in inches		23.83	24.20	24.56	24.92	25.26	25.59	25.91	26.23	26.54	26.84
Breadth of beam	in inches		16.85	17.12	17.37	17.62	17.86	18.10	18.32	18.55	18.77	18.98
Sectional area	in sup. feet		2.788	2.876	2.963	3.048	3.132	3.215	3.297	3.378	3.456	3.537
Contents	in cubic feet		75.28	77.65	79.99	82.29	84.56	86.80	89.01	91.21	93.36	95.49
Weight	in lbs.	30'	3387	3494	3599	3703	3805	3905	4005	4104	4201	4297
Deflection	in inches		.7844	.7723	.7610	.7503	.7402	.7305	.7214	.7127	.7044	.6965
Weight to deflect	L		85.99	87.33	88.70	89.97	91.20	92.40	93.57	94.71	95.82	96.91
Depth of beam	in inches		24.42	24.79	25.17	25.52	25.87	26.22	26.55	26.88	27.19	27.50
Breadth of beam	in inches		17.27	17.52	17.76	18.00	18.23	18.46	18.69	18.91	19.13	19.34
Sectional area	in sup. feet	31'	2.929	3.020	3.110	3.200	3.288	3.375	3.461	3.546	3.630	3.713
Contents	in cubic feet		81.96	84.54	87.08	89.59	92.06	94.49	96.91	99.29	101.7	104.1
Weight	in lbs.		3688	3804	3918	4031	4142	4252	4360	4468	4573	4678
Deflection	in inches		.8235	.8108	.7989	.7876	.7770	.7669	.7573	.7481	.7395	.7312
Weight to deflect	L		85.01	86.35	87.63	88.88	90.10	91.28	92.44	93.57	94.67	95.74
Depth of beam	in inches	32'	25.00	25.38	25.76	26.13	26.49	26.84	27.18	27.51	27.83	28.15
Breadth of beam	in inches		17.67	17.95	18.22	18.48	18.73	18.98	19.22	19.45	19.68	19.90
Sectional area	in sup. feet		3.067	3.164	3.259	3.353	3.445	3.536	3.627	3.716	3.804	3.891
Contents	in cubic feet		88.95	91.75	94.51	97.23	99.91	102.5	105.1	107.7	110.3	112.8
Weight	in lbs.		4002	4128	4253	4376	4496	4615	4733	4849	4964	5077
Deflection	in inches	33'	.8629	.8496	.8371	.8253	.8142	.8036	.7936	.7840	.7749	.7662
Weight to deflect	L		84.02	85.33	86.61	87.84	89.05	90.22	91.36	92.48	93.57	94.63
Depth of beam	in inches		25.56	25.96	26.35	26.73	27.09	27.45	27.79	28.14	28.47	28.79
Breadth of beam	in inches		18.08	18.36	18.63	18.90	19.16	19.41	19.65	19.90	20.12	20.35
Sectional area	in sup. feet		3.209	3.310	3.409	3.508	3.604	3.700	3.794	3.887	3.980	4.070
Contents	in cubic feet		95.26	98.29	101.2	104.1	106.9	109.7	112.5	115.2	117.9	120.6
Weight	in lbs.	34'	4331	4468	4603	4735	4865	4994	5122	5249	5372	5494
Deflection	in inches		.9027	.8889	.8758	.8634	.8518	.8407	.8302	.8202	.8106	.8016
Weight to deflect	L		83.08	84.38	85.64	86.86	88.05	89.21	90.34	91.44	92.52	93.57

CO-EFFICIENTS FOR STRENGTH FORMULÆ.

Table No. X.
Co-efficients for Deflection Formulae.

Co-efficients for Deflection Formulae.			Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R$.																								Cylinder.	$\left[\frac{E_d}{E_s} \right]$	for use with Table No. IV.																																																																																																																																																																																																																																																																																																																													
Name of timber with local synonyms.	Nature of co-efficient.	Value of E_d	Co-efficient corresponding to values of R.																																																																																																																																																																																																																																																																																																																																																							
			$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$				1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$

Table No. X.

Co-efficients for Deflection Formulae.

		Table No. X.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Name of timber with local synonyms.	Nature of co-efficient.	Value of E_d .	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R$.																																	Cylinder.	for use with Table No. IV.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table No. X.

Co-efficients for Deflection Formula.

$$\text{Value of } \frac{\text{depth}}{\text{breadth}} = \frac{a}{b} = R.$$

Co-efficient corresponding to values of R.

Name of timber with local synonyms.	Nature of co-efficient.	Value of E_d	Value of $\frac{a}{b} = R$.																																	Cylinder.	$\left[\frac{E_d}{E_d} \right]$ for use with Table No. IV.																																																																																																																																																																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45			50	55	60																																																																																																																																																													
For finding depth Reciprocal of depth For finding breadth Do. area, contents, and weight Do. breaking-weight	...	3100	.0867 1.456 3.884 2.667 .002289	.8166 1.224 2.900 1.888 .001925	.9038 1.106 1.704 1.540 .001739	.9712 1.080 1.373 1.394 .001619	.9946 1.080 1.271 1.217 .001501	1.007 1.078 1.197 1.170 .001447	.998 1.046 1.128 1.0516 .001387	.9644 1.054 1.067 1.038 .001288	.9034 1.013 1.068 1.055 .001169	.8166 1.002 1.089 1.023 .001049	.7071 1.007 1.092 1.023 .000930	.5868 1.007 1.092 1.023 .000811	.4668 1.007 1.092 1.023 .000692	.3468 1.007 1.092 1.023 .000573	.2268 1.007 1.092 1.023 .000454	.1068 1.007 1.092 1.023 .000335	.0867 1.007 1.092 1.023 .000216	.0712 1.007 1.092 1.023 .000197	.0567 1.007 1.092 1.023 .000178	.0467 1.007 1.092 1.023 .000159	.0367 1.007 1.092 1.023 .000140	.0267 1.007 1.092 1.023 .000121	.0167 1.007 1.092 1.023 .000102	.0067 1.007 1.092 1.023 .000083	.00267 1.007 1.092 1.023 .000064	.001267 1.007 1.092 1.023 .000045	.000633 1.007 1.092 1.023 .000026	.000316 1.007 1.092 1.023 .000017	.000158 1.007 1.092 1.023 .000008	.000079 1.007 1.092 1.023 .000004	.000039 1.007 1.092 1.023 .000002	.000019 1.007 1.092 1.023 .000001	.000009 1.007 1.092 1.023 .000000	.000005 1.007 1.092 1.023 .000000	.000002 1.007 1.092 1.023 .000000	.000001 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 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.000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.023 .000000	.000000 1.007 1.092 1.02

Table No. X.
Co-efficients for Deflection Formula.

Name of timber with local synonyms.	Nature of co-efficient.	Value of E_d	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R$.																																Cylinder.	for use with Table No. IV.
			Co-efficient corresponding to values of R.																																	
			$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.5	4.0	4.5	5.0	5.5	6.0				
For finding depth	...	3750	.6548	.7787	.8617	.9260	.9483	.9699	.9888	1.007	1.023	1.040	1.058	1.073	1.087	1.101	1.117	1.128	1.140	1.153	1.164	1.176	1.187	1.198	1.208	1.219	1.227	1.235	1.244	1.252	1.260	1.267	1.274	1.281		
Reciprocal of depth	...		1.537	1.284	1.160	1.079	1.025	1.001	.9337	.9757	.9601	.9457	.9322	.9197	.9080	.8970	.8865	.8768	.8676	.8588	.8504	.8424	.8348	.8275	.8205	.8138	.8074	.8012	.7952	.7894	.7838	.7784				
For finding breadth	...		3.704	2.202	1.624	1.310	1.129	1.055	1.001	1.075	1.017	.9662	.9205	.8796	.8427	.8092	.7786	.7506	.7250	.7012	.6791	.6587	.6396	.6217	.6049	.5892	.5745	.5607	.5477	.5354	.5236	.5122	.5011	.4902		
Do. area, contents, and weight	...		2.425	1.715	1.400	1.212	1.157	1.107	1.063	1.024	.9902	.9587	.9301	.9039	.8798	.8575	.8368	.8176	.7996	.7828	.7670	.7521	.7380	.7247	.7121	.7001	.6886	.6774	.6665	.6558	.6453	.6350	.6249	.6144		
Do. breaking-weight	...	3750	.001985	.001669	.001508	.001391	.001311	.001241	.001185	.001129	.001073	.001017	.000961	.000905	.000849	.000793	.000737	.000681	.000625	.000569	.000513	.000457	.000401	.000345	.000289	.000233	.000177	.000121	.000065	.000009	.000003	.000000	.000000			
For finding depth	...	3800	.6526	.7761	.8589	.9230	.9452	.9660	.9855	1.004	1.021	1.038	1.054	1.070	1.083	1.098	1.111	1.124	1.137	1.149	1.161	1.172	1.183	1.194	1.204	1.215	1.225	1.235	1.245	1.255	1.265	1.275	1.285			
Reciprocal of depth	...		1.532	1.289	1.165	1.083	1.027	1.003	1.014	.9960	.9790	.9633	.9488	.9353	.9228	.9110	.9000	.8896	.8797	.8704	.8616	.8532	.8452	.8376	.8303	.8232	.8162	.8094	.8028	.7964	.7901	.7839	.7778			
For finding breadth	...		3.692	2.195	1.619	1.305	1.125	1.051	1.007	1.072	1.014	.9630	.9175	.8767	.8399	.8065	.7761	.7482	.7225	.6989	.6769	.6565	.6376	.6191	.6017	.5854	.5692	.5532	.5374	.5218	.5064	.4911	.4760			
Do. area, contents, and weight	...		2.400	1.703	1.391	1.204	1.149	1.100	1.056	1.018	.9836	.9524	.9240	.8979	.8740	.8518	.8313	.8122	.7944	.7776	.7619	.7471	.7328	.7189	.7054	.6922	.6792	.6664	.6538	.6414	.6291	.6170	.6050			
Do. breaking-weight	...	3800	.001965	.001652	.001493	.001390	.001337	.001283	.001230	.001178	.001126	.001074	.001022	.000970	.000918	.000866	.000814	.000762	.000710	.000658	.000606	.000554	.000502	.000450	.000398	.000346	.000294	.000242	.000190	.000138	.000086	.000034	.000000			
For finding depth	...	3850	.6505	.7726	.8551	.9199	.9421	.9628	.9823	1.000	1.018	1.033	1.051	1.066	1.080	1.094	1.107	1.120	1.133	1.145	1.157	1.168	1.179	1.190	1.201	1.211	1.221	1.231	1.241	1.251	1.261	1.271	1.281			
Reciprocal of depth	...		1.537	1.292	1.168	1.087	1.031	1.007	1.017	.9992	.9822	.9664	.9519	.9384	.9258	.9140	.9029	.8925	.8826	.8733	.8644	.8558	.8476	.8397	.8320	.8245	.8172	.8101	.8031	.7962	.7894	.7827	.7761			
For finding breadth	...		3.680	2.188	1.614	1.301	1.121	1.047	1.003	1.068	1.010	.9599	.9145	.8739	.8372	.8039	.7735	.7457	.7202	.6967	.6747	.6544	.6356	.6181	.6017	.5854	.5692	.5532	.5374	.5218	.5064	.4911	.4760			
Do. area, contents, and weight	...		2.394	1.692	1.382	1.197	1.141	1.092	1.048	1.011	.9773	.9462	.9179	.8921	.8683	.8463	.8259	.8069	.7892	.7726	.7569	.7421	.7280	.7144	.7012	.6882	.6754	.6628	.6503	.6379	.6256	.6134	.6013			
Do. breaking-weight	...	3850	.001946	.001637	.001479	.001376	.001323	.001269	.001215	.001161	.001107	.001053	.000999	.000945	.000891	.000837	.000783	.000729	.000675	.000621	.000567	.000513	.000459	.000405	.000351	.000297	.000243	.000189	.000135	.000081	.000027	.000000	.000000			
For finding depth	...	3900	.6484	.7711	.8534	.9170	.9391	.9597	.9791	1.000	1.014	1.031	1.047	1.062	1.077	1.091	1.104	1.117	1.129	1.141	1.153	1.164	1.175	1.186	1.197	1.207	1.217	1.227	1.237	1.247	1.257	1.267	1.277			
Reciprocal of depth	...		1.542	1.296	1.171	1.090	1.035	1.011	1.021	.9975	.9805	.9646	.9491	.9341	.9196	.9056	.8921	.8791	.8666	.8544	.8426	.8311	.8200	.8092	.7987	.7884	.7782	.7681	.7581	.7482	.7384	.7287	.7191			
For finding breadth	...		3.668	2.181	1.609	1.296	1.116	1.042	1.007	1.063	1.005	.9559	.9105	.8700	.8345	.8029	.7743	.7487	.7252	.7037	.6842	.6656	.6480	.6314	.6158	.6002	.5847	.5692	.5538	.5384	.5231	.5079	.4927	.4776		
Do. area, contents, and weight	...		2.378	1.681	1.373	1.189	1.133	1.084	1.040	1.003	.9700	.9387	.9094	.8821	.8568	.8325	.8092	.7869	.7656	.7453	.7260	.7076	.6901	.6736	.6581	.6427	.6274	.6121	.5969	.5817	.5665	.5513	.5361	.5210		
Do. breaking-weight	...	3900	.001928	.001621	.001464	.001363	.001310	.001256	.001202	.001148	.001094	.001040	.000986	.000932	.000878	.000824	.000770	.000716	.000662	.000608	.000554	.000500	.000446	.000392	.000338	.000284	.000230	.000176	.000122	.000068	.000014	.000000	.000000			
For finding depth	...	3950	.6463	.7686	.8506	.9141	.9361	.9567	.9760	1.000	1.012	1.029	1.044	1.059	1.073	1.087	1.100	1.113	1.125	1.138	1.149	1.161	1.172	1.183	1.194	1.204	1.214	1.224	1.234	1.244	1.254	1.264	1.274			
Reciprocal of depth	...		1.547	1.301	1.175	1.094	1.039	1.015	1.025	.9975	.9805	.9646	.9491	.9341	.9196	.9056	.8921	.8791	.8666	.8544	.8426	.8311	.8200	.8092	.7987	.7884	.7782	.7681	.7581	.7482	.7384	.7287	.7191			
For finding breadth	...		3.656	2.174	1.604	1.292	1.112	1.038	1.003	1.059	1.001	.9509	.9055	.8650	.8295	.7980	.7695	.7439	.7204	.6989	.6794	.6609	.6434	.6268	.6112	.5956	.5800	.5644	.5488	.5332	.5176	.5020	.4864	.4708		
Do. area, contents, and weight	...		2.363	1.672	1.364	1.181	1.125	1.076	1.032	1.000	.9677	.9364	.9071	.8800	.8548	.8306	.8074	.7851	.7638	.7434	.7240	.7056	.6881	.6716	.6551	.6386	.6221	.6056	.5891	.5726	.5561	.5396	.5231	.5079		
Do. breaking-weight	...	3950	.001909	.001605	.001450	.001350	.001297	.001243	.001189	.001135	.001081	.001027	.000973	.000919	.000865	.000811	.000757	.000703	.000649	.000595	.000541	.00048														

Table No. X.
Co-efficients for Deflection Formulae.

Table No. X.			Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$																																				Cylinder.	$\frac{E_d}{E_b}$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Name of timber with local synonyms.	Nature of co-efficient.	Value of E_d	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.5	4.0	4.5	5.0	5.5	6.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			Co-efficient corresponding to values of R.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
For finding depth ...	...	4400	.6291	.7482	.8280	.8897	.9112	.9312	.9500	.9678	.9846	1.001	1.016	1.031	1.044	1.058	1.071	1.083	1.095	1.107	1.119	1.130	1.141	1.151	1.161	1.171	1.181	1.191	1.201	1.211	1.221	1.231	1.241	1.251	1.261	1.271	1.281	1.291	1.301	1.311	1.321	1.331	1.341	1.351	1.361	1.371	1.381	1.391	1.401	1.411	1.421	1.431	1.441	1.451	1.461	1.471	1.481	1.491	1.501	1.511	1.521	1.531	1.541	1.551	1.561	1.571	1.581	1.591	1.601	1.611	1.621	1.631	1.641	1.651	1.661	1.671	1.681	1.691	1.701	1.711	1.721	1.731	1.741	1.751	1.761	1.771	1.781	1.791	1.801	1.811	1.821	1.831	1.841	1.851	1.861	1.871	1.881	1.891	1.901	1.911	1.921	1.931	1.941	1.951	1.961	1.971	1.981	1.991	2.001	2.011	2.021	2.031	2.041	2.051	2.061	2.071	2.081	2.091	2.101	2.111	2.121	2.131	2.141	2.151	2.161	2.171	2.181	2.191	2.201	2.211	2.221	2.231	2.241	2.251	2.261	2.271	2.281	2.291	2.301	2.311	2.321	2.331	2.341	2.351	2.361	2.371	2.381	2.391	2.401	2.411	2.421	2.431	2.441	2.451	2.461	2.471	2.481	2.491	2.501	2.511	2.521	2.531	2.541	2.551	2.561	2.571	2.581	2.591	2.601	2.611	2.621	2.631	2.641	2.651	2.661	2.671	2.681	2.691	2.701	2.711	2.721	2.731	2.741	2.751	2.761	2.771	2.781	2.791	2.801	2.811	2.821	2.831	2.841	2.851	2.861	2.871	2.881	2.891	2.901	2.911	2.921	2.931	2.941	2.951	2.961	2.971	2.981	2.991	3.001	3.011	3.021	3.031	3.041	3.051	3.061	3.071	3.081	3.091	3.101	3.111	3.121	3.131	3.141	3.151	3.161	3.171	3.181	3.191	3.201	3.211	3.221	3.231	3.241	3.251	3.261	3.271	3.281	3.291	3.301	3.311	3.321	3.331	3.341	3.351	3.361	3.371	3.381	3.391	3.401	3.411	3.421	3.431	3.441	3.451	3.461	3.471	3.481	3.491	3.501	3.511	3.521	3.531	3.541	3.551	3.561	3.571	3.581	3.591	3.601	3.611	3.621	3.631	3.641	3.651	3.661	3.671	3.681	3.691	3.701	3.711	3.721	3.731	3.741	3.751	3.761	3.771	3.781	3.791	3.801	3.811	3.821	3.831	3.841	3.851	3.861	3.871	3.881	3.891	3.901	3.911	3.921	3.931	3.941	3.951	3.961	3.971	3.981	3.991	4.001	4.011	4.021	4.031	4.041	4.051	4.061	4.071	4.081	4.091	4.101	4.111	4.121	4.131	4.141	4.151	4.161	4.171	4.181	4.191	4.201	4.211	4.221	4.231	4.241	4.251	4.261	4.271	4.281	4.291	4.301	4.311	4.321	4.331	4.341	4.351	4.361	4.371	4.381	4.391	4.401	4.411	4.421	4.431	4.441	4.451	4.461	4.471	4.481	4.491	4.501	4.511	4.521	4.531	4.541	4.551	4.561	4.571	4.581	4.591	4.601	4.611	4.621	4.631	4.641	4.651	4.661	4.671	4.681	4.691	4.701	4.711	4.721	4.731	4.741	4.751	4.761	4.771	4.781	4.791	4.801	4.811	4.821	4.831	4.841	4.851	4.861	4.871	4.881	4.891	4.901	4.911	4.921	4.931	4.941	4.951	4.961	4.971	4.981	4.991	5.001	5.011	5.021	5.031	5.041	5.051	5.061	5.071	5.081	5.091	5.101	5.111	5.121	5.131	5.141	5.151	5.161	5.171	5.181	5.191	5.201	5.211	5.221	5.231	5.241	5.251	5.261	5.271	5.281	5.291	5.301	5.311	5.321	5.331	5.341	5.351	5.361	5.371	5.381	5.391	5.401	5.411	5.421	5.431	5.441	5.451	5.461	5.471	5.481	5.491	5.501	5.511	5.521	5.531	5.541	5.551	5.561	5.571	5.581	5.591	5.601	5.611	5.621	5.631	5.641	5.651	5.661	5.671	5.681	5.691	5.701	5.711	5.721	5.731	5.741	5.751	5.761	5.771	5.781	5.791	5.801	5.811	5.821	5.831	5.841	5.851	5.861	5.871	5.881	5.891	5.901	5.911	5.921	5.931	5.941	5.951	5.961	5.971	5.981	5.991	6.001	6.011	6.021	6.031	6.041	6.051	6.061	6.071	6.081	6.091	6.101	6.111	6.121	6.131	6.141	6.151	6.161	6.171	6.181	6.191	6.201	6.211	6.221	6.231	6.241	6.251	6.261	6.271	6.281	6.291	6.301	6.311	6.321	6.331	6.341	6.351	6.361	6.371	6.381	6.391	6.401	6.411	6.421	6.431	6.441	6.451	6.461	6.471	6.481	6.491	6.501	6.511	6.521	6.531	6.541	6.551	6.561	6.571	6.581	6.591	6.601	6.611	6.621	6.631	6.641	6.651	6.661	6.671	6.681	6.691	6.701	6.711	6.721	6.731	6.741	6.751	6.761	6.771	6.781	6.791	6.801	6.811	6.821	6.831	6.841	6.851	6.861	6.871	6.881	6.891	6.901	6.911	6.921	6.931	6.941	6.951	6.961	6.971	6.981	6.991	7.001	7.011	7.021	7.031	7.041	7.051	7.061	7.071	7.081	7.091	7.101	7.111	7.121	7.131	7.141	7.151	7.161	7.171	7.181	7.191	7.201	7.211	7.221	7.231	7.241	7.251	7.261	7.271	7.281	7.291	7.301	7.311	7.321	7.331	7.341	7.351	7.361	7.371	7.381	7.391	7.401	7.411	7.421	7.431	7.441	7.451	7.461	7.471	7.481	7.491	7.501	7.511	7.521	7.531	7.541	7.551	7.561	7.571	7.581	7.591	7.601	7.611	7.621	7.631	7.641	7.651	7.661	7.671	7.681	7.691	7.701	7.711	7.721	7.731	7.741	7.751	7.761	7.771	7.781	7.791	7.801	7.811	7.821	7.831	7.841	7.851	7.861	7.871	7.881	7.891	7.901	7.911	7.921	7.931	7.941	7.951	7.961	7.971	7.981	7.991	8.001	8.011	8.021	8.031	8.041	8.051	8.061	8.071	8.081	8.091	8.101	8.111	8.121	8.131	8.141	8.151	8.161	8.171	8.181	8.191	8.201	8.211	8.221	8.231	8.241	8.251	8.261	8.271	8.281	8.291	8.301	8.311	8.321	8.331	8.341	8.351	8.361	8.371	8.381	8.391	8.401	8.411	8.421	8.431	8.441	8.451	8.461	8.471	8.481	8.491	8.501	8.511	8.521	8.531	8.54.

Table No. X.
Co-efficients for Deflection Formulæ.

Name of timber with local synonyms.	Nature of co-efficients.	Value of E_d	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R$.																																	Cylinder.	for use in Table No. IV																																																																																																																																																																																																																																																																																																																								
			Co-efficient corresponding to values of R.																																																																																																																																																																																																																																																																																																																																																										
			$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.5	4.0	4.5	5.0	5.5	6.0																																																																																																																																																																																																																																																																																																																													
For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...	For finding depth...	Reciprocal of depth...	For finding breadth...	Do. area, contents, and weight...	Do. breaking-weight...

* In last column but one, is co-efficient for finding girth of log of timber.

Table No. XI.

Co-efficients for Strength Formulae.

$$\text{Value of } \frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$$

Name of timber with local synonyms.			Nature of co-efficients.	Value of P_b	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R$.																																																												Cylinder.	$\left[\frac{P_b}{P_c} \right]$ for use with Table No. IV.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
					Co-efficient corresponding to values of R.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	55	60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
For finding depth	Reciprocal of depth	For finding breadth	Do. area, contents, and weight	Do. deflection	400	.7071	.8909	1.019	1.123	1.208	1.278	1.338	1.390	1.437	1.480	1.518	1.553	1.585	1.615	1.643	1.669	1.693	1.715	1.736	1.755	1.772	1.788	1.803	1.817	1.830	1.842	1.853	1.864	1.874	1.884	1.893	1.902	1.910	1.918	1.925	1.932	1.939	1.945	1.951	1.957	1.962	1.967	1.972	1.977	1.982	1.987	1.992	1.997	2.002	2.007	2.012	2.017	2.022	2.027	2.032	2.037	2.042	2.047	2.052	2.057	2.062	2.067	2.072	2.077	2.082	2.087	2.092	2.097	2.102	2.107	2.112	2.117	2.122	2.127	2.132	2.137	2.142	2.147	2.152	2.157	2.162	2.167	2.172	2.177	2.182	2.187	2.192	2.197	2.202	2.207	2.212	2.217	2.222	2.227	2.232	2.237	2.242	2.247	2.252	2.257	2.262	2.267	2.272	2.277	2.282	2.287	2.292	2.297	2.302	2.307	2.312	2.317	2.322	2.327	2.332	2.337	2.342	2.347	2.352	2.357	2.362	2.367	2.372	2.377	2.382	2.387	2.392	2.397	2.402	2.407	2.412	2.417	2.422	2.427	2.432	2.437	2.442	2.447	2.452	2.457	2.462	2.467	2.472	2.477	2.482	2.487	2.492	2.497	2.502	2.507	2.512	2.517	2.522	2.527	2.532	2.537	2.542	2.547	2.552	2.557	2.562	2.567	2.572	2.577	2.582	2.587	2.592	2.597	2.602	2.607	2.612	2.617	2.622	2.627	2.632	2.637	2.642	2.647	2.652	2.657	2.662	2.667	2.672	2.677	2.682	2.687	2.692	2.697	2.702	2.707	2.712	2.717	2.722	2.727	2.732	2.737	2.742	2.747	2.752	2.757	2.762	2.767	2.772	2.777	2.782	2.787	2.792	2.797	2.802	2.807	2.812	2.817	2.822	2.827	2.832	2.837	2.842	2.847	2.852	2.857	2.862	2.867	2.872	2.877	2.882	2.887	2.892	2.897	2.902	2.907	2.912	2.917	2.922	2.927	2.932	2.937	2.942	2.947	2.952	2.957	2.962	2.967	2.972	2.977	2.982	2.987	2.992	2.997	3.002	3.007	3.012	3.017	3.022	3.027	3.032	3.037	3.042	3.047	3.052	3.057	3.062	3.067	3.072	3.077	3.082	3.087	3.092	3.097	3.102	3.107	3.112	3.117	3.122	3.127	3.132	3.137	3.142	3.147	3.152	3.157	3.162	3.167	3.172	3.177	3.182	3.187	3.192	3.197	3.202	3.207	3.212	3.217	3.222	3.227	3.232	3.237	3.242	3.247	3.252	3.257	3.262	3.267	3.272	3.277	3.282	3.287	3.292	3.297	3.302	3.307	3.312	3.317	3.322	3.327	3.332	3.337	3.342	3.347	3.352	3.357	3.362	3.367	3.372	3.377	3.382	3.387	3.392	3.397	3.402	3.407	3.412	3.417	3.422	3.427	3.432	3.437	3.442	3.447	3.452	3.457	3.462	3.467	3.472	3.477	3.482	3.487	3.492	3.497	3.502	3.507	3.512	3.517	3.522	3.527	3.532	3.537	3.542	3.547	3.552	3.557	3.562	3.567	3.572	3.577	3.582	3.587	3.592	3.597	3.602	3.607	3.612	3.617	3.622	3.627	3.632	3.637	3.642	3.647	3.652	3.657	3.662	3.667	3.672	3.677	3.682	3.687	3.692	3.697	3.702	3.707	3.712	3.717	3.722	3.727	3.732	3.737	3.742	3.747	3.752	3.757	3.762	3.767	3.772	3.777	3.782	3.787	3.792	3.797	3.802	3.807	3.812	3.817	3.822	3.827	3.832	3.837	3.842	3.847	3.852	3.857	3.862	3.867	3.872	3.877	3.882	3.887	3.892	3.897	3.902	3.907	3.912	3.917	3.922	3.927	3.932	3.937	3.942	3.947	3.952	3.957	3.962	3.967	3.972	3.977	3.982	3.987	3.992	3.997	4.002	4.007	4.012	4.017	4.022	4.027	4.032	4.037	4.042	4.047	4.052	4.057	4.062	4.067	4.072	4.077	4.082	4.087	4.092	4.097	4.102	4.107	4.112	4.117	4.122	4.127	4.132	4.137	4.142	4.147	4.152	4.157	4.162	4.167	4.172	4.177	4.182	4.187	4.192	4.197	4.202	4.207	4.212	4.217	4.222	4.227	4.232	4.237	4.242	4.247	4.252	4.257	4.262	4.267	4.272	4.277	4.282	4.287	4.292	4.297	4.302	4.307	4.312	4.317	4.322	4.327	4.332	4.337	4.342	4.347	4.352	4.357	4.362	4.367	4.372	4.377	4.382	4.387	4.392	4.397	4.402	4.407	4.412	4.417	4.422	4.427	4.432	4.437	4.442	4.447	4.452	4.457	4.462	4.467	4.472	4.477	4.482	4.487	4.492	4.497	4.502	4.507	4.512	4.517	4.522	4.527	4.532	4.537	4.542	4.547	4.552	4.557	4.562	4.567	4.572	4.577	4.582	4.587	4.592	4.597	4.602	4.607	4.612	4.617	4.622	4.627	4.632	4.637	4.642	4.647	4.652	4.657	4.662	4.667	4.672	4.677	4.682	4.687	4.692	4.697	4.702	4.707	4.712	4.717	4.722	4.727	4.732	4.737	4.742	4.747	4.752	4.757	4.762	4.767	4.772	4.777	4.782	4.787	4.792	4.797	4.802	4.807	4.812	4.817	4.822	4.827	4.832	4.837	4.842	4.847	4.852	4.857	4.862	4.867	4.872	4.877	4.882	4.887	4.892	4.897	4.902	4.907	4.912	4.917	4.922	4.927	4.932	4.937	4.942	4.947	4.952	4.957	4.962	4.967	4.972	4.977	4.982	4.987	4.992	4.997	5.002	5.007	5.012	5.017	5.022	5.027	5.032	5.037	5.042	5.047	5.052	5.057	5.062	5.067	5.072	5.077	5.082	5.087	5.092	5.097	5.102	5.107	5.112	5.117	5.122	5.127	5.132	5.137	5.142	5.147	5.152	5.157	5.162	5.167	5.172	5.177	5.182	5.187	5.192	5.197	5.202	5.207	5.212	5.217	5.222	5.227	5.232	5.237	5.242	5.247	5.252	5.257	5.262	5.267	5.272	5.277	5.282	5.287	5.292	5.297	5.302	5.307	5.312	5.317	5.322	5.327	5.332	5.337	5.342	5.347	5.352	5.357	5.362	5.367	5.372	5.377	5.382	5.387	5.392	5.397	5.402	5.407	5.412	5.417	5.422	5.427	5.432	5.437	5.442	5.447	5.452	5.457	5.462	5.467	5.472	5.477	5.482	5.487	5.492	5.497	5.502	5.507	5.512	5.517	5.522	5.527	5.532	5.537	5.542	5.547	5.552	5.557	5.562	5.567	5.572	5.577	5.582	5.587	5.592	5.597	5.602	5.607	5.612	5.617	5.622	5.627	5.632

Co-efficients for Strength Formulæ.

Co-efficients for Strength Formula.

Name of timber with local synonyms.	Nature of co-efficient.	Value of P_b	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$																												Cylinder.	for use with Table No. IV.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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For finding depth	Reciprocal of depth	...	6350	8019	9171	1010	1043	1100	1120	1155	1181	1204	1228	1251	1271	1292	1313	1332	1351	1370	1388	1405	1423	1439	1456	1472	1488	1503	1518	1532	1547	1562	1576	1591	1605	1620	1634	1648	1663	1677	1691	1706	1720	1734	1748	1762	1776	1790	1804	1818	1832	1846	1860	1874	1888	1902	1916	1930	1944	1958	1972	1986	2000	2014	2028	2042	2056	2070	2084	2098	2112	2126	2140	2154	2168	2182	2196	2210	2224	2238	2252	2266	2280	2294	2308	2322	2336	2350	2364	2378	2392	2406	2420	2434	2448	2462	2476	2490	2504	2518	2532	2546	2560	2574	2588	2602	2616	2630	2644	2658	2672	2686	2700	2714	2728	2742	2756	2770	2784	2798	2812	2826	2840	2854	2868	2882	2896	2910	2924	2938	2952	2966	2980	2994	3008	3022	3036	3050	3064	3078	3092	3106	3120	3134	3148	3162	3176	3190	3204	3218	3232	3246	3260	3274	3288	3302	3316	3330	3344	3358	3372	3386	3400	3414	3428	3442	3456	3470	3484	3498	3512	3526	3540	3554	3568	3582	3596	3610	3624	3638	3652	3666	3680	3694	3708	3722	3736	3750	3764	3778	3792	3806	3820	3834	3848	3862	3876	3890	3904	3918	3932	3946	3960	3974	3988	4002	4016	4030	4044	4058	4072	4086	4100	4114	4128	4142	4156	4170	4184	4198	4212	4226	4240	4254	4268	4282	4296	4310	4324	4338	4352	4366	4380	4394	4408	4422	4436	4450	4464	4478	4492	4506	4520	4534	4548	4562	4576	4590	4604	4618	4632	4646	4660	4674	4688	4702	4716	4730	4744	4758	4772	4786	4800	4814	4828	4842	4856	4870	4884	4898	4912	4926	4940	4954	4968	4982	4996	5010	5024	5038	5052	5066	5080	5094	5108	5122	5136	5150	5164	5178	5192	5206	5220	5234	5248	5262	5276	5290	5304	5318	5332	5346	5360	5374	5388	5402	5416	5430	5444	5458	5472	5486	5500	5514	5528	5542	5556	5570	5584	5598	5612	5626	5640	5654	5668	5682	5696	5710	5724	5738	5752	5766	5780	5794	5808	5822	5836	5850	5864	5878	5892	5906	5920	5934	5948	5962	5976	5990	6004	6018	6032	6046	6060	6074	6088	6102	6116	6130	6144	6158	6172	6186	6200	6214	6228	6242	6256	6270	6284	6298	6312	6326	6340	6354	6368	6382	6396	6410	6424	6438	6452	6466	6480	6494	6508	6522	6536	6550	6564	6578	6592	6606	6620	6634	6648	6662	6676	6690	6704	6718	6732	6746	6760	6774	6788	6802	6816	6830	6844	6858	6872	6886	6900	6914	6928	6942	6956	6970	6984	6998	7012	7026	7040	7054	7068	7082	7096	7110	7124	7138	7152	7166	7180	7194	7208	7222	7236	7250	7264	7278	7292	7306	7320	7334	7348	7362	7376	7390	7404	7418	7432	7446	7460	7474	7488	7502	7516	7530	7544	7558	7572	7586	7600	7614	7628	7642	7656	7670	7684	7698	7712	7726	7740	7754	7768	7782	7796	7810	7824	7838	7852	7866	7880	7894	7908	7922	7936	7950	7964	7978	7992	8006	8020	8034	8048	8062	8076	8090	8104	8118	8132	8146	8160	8174	8188	8202	8216	8230	8244	8258	8272	8286	8300	8314	8328	8342	8356	8370	8384	8398	8412	8426	8440	8454	8468	8482	8496	8510	8524	8538	8552	8566	8580	8594	8608	8622	8636	8650	8664	8678	8692	8706	8720	8734	8748	8762	8776	8790	8804	8818	8832	8846	8860	8874	8888	8902	8916	8930	8944	8958	8972	8986	9000	9014	9028	9042	9056	9070	9084	9098	9112	9126	9140	9154	9168	9182	9196	9210	9224	9238	9252	9266	9280	9294	9308	9322	9336	9350	9364	9378	9392	9406	9420	9434	9448	9462	9476	9490	9504	9518	9532	9546	9560	9574	9588	9602	9616	9630	9644	9658	9672	9686	9700	9714	9728	9742	9756	9770	9784	9798	9812	9826	9840	9854	9868	9882	9896	9910	9924	9938	9952	9966	9980	9994	10008	10022	10036	10050	10064	10078	10092	10106	10120	10134	10148	10162	10176	10190	10204	10218	10232	10246	10260	10274	10288	10302	10316	10330	10344	10358	10372	10386	10400	10414	10428	10442	10456	10470	10484	10498	10512	10526	10540	10554	10568	10582	10596	10610	10624	10638	10652	10666	10680	10694	10708	10722	10736	10750	10764	10778	10792	10806	10820	10834	10848	10862	10876	10890	10904	10918	10932	10946	10960	10974	10988	11002	11016	11030	11044	11058	11072	11086	11100	11114	11128	11142	11156	11170	11184	11198	11212	11226	11240	11254	11268	11282	11296	11310	11324	11338	11352	11366	11380	11394	11408	11422	11436	11450	11464	11478	11492	11506	11520	11534	11548	11562	11576	11590	11604	11618	11632	11646	11660	11674	11688	11702	11716	11730	11744	11758	11772	11786	11800	11814	11828	11842	11856	11870	11884	11898	11912	11926	11940	11954	11968	11982	11996	12010	12024	12038	12052	12066	12080	12094	12108	12122	12136	12150	12164	12178	12192	12206	12220	12234	12248	12262	12276	12290	12304	12318	12332	12346	12360	12374	12388	12402	12416	12430	12444	12458	12472	12486	12500	12514	12528	12542	12556	12570	12584	12598	12612	12626	12640	12654	12668	12682	12696	12710	12724	12738	12752	12766	12780	12794	12808	12822	12836	12850	12864	12878	12892	12906	12920	12934	12948	12962	12976	12990	13004	13018	13032	13046	13060	13074	13088	13102	13116	13130	13144	13158	13172	13186	13200	13214	13228	13242	13256	13270	13284	13298	13312	13326	13340	13354	13368	13382	13396	13410	13424	13438	13452	13466	13480	13494	13508	13522	13536	13550	13564	13578	13592	13606	13620	13634	13648	13662	13676	13690	13704	13718	13732	13746	13760	13774	13788	13802	13816	13830	13844	13858	13872	13886	13900	13914	13928	13942	13956	13970	13984	13998	14012	14026	14040	14054	14068	14082	14096	14110	14124	14138	14152	14166	14180	14194	14208	14222	14236	14250	14264	14278	14292	14306	14320	14334	14348	14362	14376	14390	14404	14418	14432	14446	14460	14474	14488	14502	14516	14530	14544	14558	14572	14586	14600	14614	14628	14642	14656	14670	14684	14698	14712	14726	14740	14754	14768	14782	14796	14810	14824	14838	14852	14866	14880	14894	14908	14922	14936	14950	14964	14978	14992	15006	15020	15034	15048	15062	15076	15090	15104	15118	15132	15146	15160	15174	15188	15202	15216	15230	15244	15258	15272	15286	15300	15314	15328	15342	15356	15370	15384	15398	15412	15426	15440	15454	15468	15482	15496	15510	15524	15538	15552	15566	15580	15594	15608	15622	15636	15650	15664	15678	15692	15706	15720	15734	15748	15762	15776	15790	15804	15818	15832	15846	15860	15874	15888	15902	15916	15930	15944	15958	15972	15986	16000	16014	16028	16042	16056	16070	16084	16098	16112	16126	16140	16154	16168	16182	16196	16210	16224	16238	16252	16266	16280	16294	16308	16322	16336	16350	16364	16378	16392	16406	16420	16434	16448	16462	16476	16490	16504	16518	16532	16546	16560	16574	16588	16602	16616	16630	16644	16658	16672	16686	16700	16714	16728	16742	16756	16770	16784	16798	16812	16826	16840	16854	16868	16882	16896	16910	16924	16938	16952	16966	16980	16994	17008	17022	17036	17050	17064	17078	17092	17106	17120	17134	17148	17162	17176	17190	17204	17218	17232	17246	17260	17274	17288	17302	17316	17330	17344	17358	17372	17386	17400	17414	17428	17442	17456	17470	17484	17498	17512	17526	17540	17554	17568	17582	17596	17610	17624	17638	17652	17666	17680	17694	17708	17722	17736	17750	17764	17778	17792	17806	17820	178

Table No. XI.
Co-efficients for Strength Formulae.

Table No. XI.		Co-efficients for Strength Formulae.		Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$		Cylinder.		for use with Table No. IV.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Name of timber with local synonyms.	Nature of co-efficient.	Value of P_b	Co-efficient corresponding to values of R.																											Cylinder.	for use with Table No. IV.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27			28	29	30	35	40	45	50	55	60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
For finding depth	Reciprocal of depth	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...</

Table No. XI.

Co-efficients for Strength Formulæ.

Name of timber with local synonyms.	Nature of co-efficient.	Value of P_b	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$																																Cylinder.	for use with Table No. IV.																																																																																																																																																																																																																																																																																																																										
			Co-efficient corresponding to values of R.																																																																																																																																																																																																																																																																																																																																																											
			$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$			1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$

$$\text{Value of } \frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$$

Table No. XI.
Co-efficients for Strength Formulae.

Name of timber with local synonyms.		Nature of co-efficient.	Value of P_b	Value of $\frac{\text{depth}}{\text{breadth}} = \frac{d}{b} = R.$																															Cylinder.	$\left[\frac{P_{b_1}}{P_b} \right]$ for use with Table No. IV.	
				Co-efficient corresponding to values of R.																																	
				$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.5	4.0	4.5	5.0	5.5	6.0				
For finding depth Reciprocal of depth For finding breadth Do. area, contents, and weight Do. deflection	...	...	...	5227	6566	7539	8298	8865	9188	9506	9283	9498	9706	9903	1010	1027	1045	1062	1079	1095	1111	1126	1141	1155	1170	1184	1197	1260	1317	1370	1419	1464	1507	9899			
				1913	1518	1326	1206	1167	1134	1105	1077	1052	1030	1010	9907	9730	9565	9410	9266	9129	9001	8879	8764	8654	8550	8450	8355	8263	8177	8094	8013	7934	7857	7782			
				2957	1863	1421	1173	1101	1064	1032	1005	9825	9596	9368	9141	8915	8690	8465	8240	8015	7790	7565	7340	7115	6890	6665	6440	6215	5990	5765	5540	5315	5090	4865			
				9232	7328	6401	5816	5634	5473	5329	5199	5081	4972	4873	4781	4696	4616	4541	4472	4406	4344	4285	4229	4176	4126	4078	4032	3989	3948	3909	3870	3832	3795	3759			
To deflect	L	40	990	0001083	0001365	0001562	0001719	0001775	0001827	0001884	0001927	0001968	0002011	0002052	0002091	0002129	0002166	0002201	0002236	0002269	0002302	0002334	0002364	0002394	0002423	0002451	0002479	0002506	0002532	0002557	0002581	0002604	0002626	9866			
				0001083	0001365	0001562	0001719	0001775	0001827	0001884	0001927	0001968	0002011	0002052	0002091	0002129	0002166	0002201	0002236	0002269	0002302	0002334	0002364	0002394	0002423	0002451	0002479	0002506	0002532	0002557	0002581	0002604	0002626				
				0001083	0001365	0001562	0001719	0001775	0001827	0001884	0001927	0001968	0002011	0002052	0002091	0002129	0002166	0002201	0002236	0002269	0002302	0002334	0002364	0002394	0002423	0002451	0002479	0002506	0002532	0002557	0002581	0002604	0002626				
				0001083	0001365	0001562	0001719	0001775	0001827	0001884	0001927	0001968	0002011	0002052	0002091	0002129	0002166	0002201	0002236	0002269	0002302	0002334	0002364	0002394	0002423	0002451	0002479	0002506	0002532	0002557	0002581	0002604	0002626				
For finding depth Reciprocal of depth For finding breadth Do. area, contents, and weight Do. deflection	...	...	...	5210	6564	7514	8270	8837	9168	9486	9263	9478	9673	9870	1006	1024	1042	1059	1075	1092	1107	1123	1137	1151	1165	1179	1192	1255	1313	1365	1414	1459	1503	9866			
				1919	1523	1331	1209	1171	1138	1107	1080	1056	1033	1013	9940	9762	9596	9442	9297	9160	9031	8909	8793	8683	8579	8479	8383	8293	8207	8124	8043	7964	7887	7811			
				2947	1856	1416	1170	1097	1060	1028	1001	9781	9552	9323	9094	8865	8636	8407	8178	7949	7720	7491	7262	7033	6804	6575	6346	6117	5888	5659	5430	5201	4972	4743			
				9357	7426	6487	5894	5710	5547	5399	5269	5149	5039	4938	4845	4759	4678	4603	4532	4465	4402	4343	4287	4233	4181	4131	4082	4034	3987	3941	3896	3852	3809				
To deflect	L	40	1000	0001068	0001346	0001541	0001696	0001751	0001803	0001851	0001897	0001942	0001984	0002024	0002063	0002101	0002137	0002172	0002206	0002239	0002271	0002302	0002332	0002362	0002391	0002419	0002446	0002472	0002497	0002521	0002544	0002566	0002588	0002609			
				0001068	0001346	0001541	0001696	0001751	0001803	0001851	0001897	0001942	0001984	0002024	0002063	0002101	0002137	0002172	0002206	0002239	0002271	0002302	0002332	0002362	0002391	0002419	0002446	0002472	0002497	0002521	0002544	0002566	0002588	0002609			
				0001068	0001346	0001541	0001696	0001751	0001803	0001851	0001897	0001942	0001984	0002024	0002063	0002101	0002137	0002172	0002206	0002239	0002271	0002302	0002332	0002362	0002391	0002419	0002446	0002472	0002497	0002521	0002544	0002566	0002588	0002609			
				0001068	0001346	0001541	0001696	0001751	0001803	0001851	0001897	0001942	0001984	0002024	0002063	0002101	0002137	0002172	0002206	0002239	0002271	0002302	0002332	0002362	0002391	0002419	0002446	0002472	0002497	0002521	0002544	0002566	0002588	0002609			
For finding depth Reciprocal of depth For finding breadth Do. area, contents, and weight Do. deflection	...	...	...	5192	6542	7489	8243	8809	9141	9459	9236	9451	9646	9843	1003	1021	1038	1055	1072	1088	1103	1118	1133	1147	1162	1175	1189	1251	1308	1361	1410	1455	1497	9833			
				1925	1528	1335	1213	1175	1141	1111	1084	1060	1037	1017	9973	9795	9629	9473	9328	9190	9061	8938	8822	8712	8607	8507	8411	8319	8230	8144	8060	7978	7897	7817			
				2937	1850	1412	1163	1094	1057	1025	1000	9771	9542	9313	9084	8855	8626	8397	8168	7939	7710	7481	7252	7023	6794	6565	6336	6107	5878	5649	5420	5191	4962	4733			
				9481	7525	6574	5973	5786	5621	5473	5339	5218	5107	5004	4910	4822	4740	4664	4592	4523	4461	4401	4344	4289	4235	4183	4133	4084	4036	3989	3943	3897	3852	3807			
To deflect	L	40	1010	0001055	0001328	0001521	0001674	0001728	0001779	0001827	0001872	0001916	0001958	0001998	0002036	0002073	0002109	0002144	0002177	0002210	0002241	0002272	0002302	0002331	0002359	0002387	0002414	0002440	0002465	0002489	0002512	0002534	0002556	0002577			
				0001055	0001328	0001521	0001674	0001728	0001779	0001827	0001872	0001916	0001958	0001998	0002036	0002073	0002109	0002144	0002177	0002210	0002241	0002272	0002302	0002331	0002359	0002387	0002414	0002440	0002465	0002489	0002512	0002534	0002556	0002577			
				0001055	0001328	0001521	0001674	0001728	0001779	0001827	0001872	0001916	0001958	0001998	0002036	0002073	0002109	0002144	0002177	0002210	0002241	0002272	0002302	0002331	0002359	0002387	0002414	0002440	0002465	0002489	0002512	0002534	0002556	0002577			
				0001055	0001328	0001521	0001674	0001728	0001779	0001827	0001872	0001916	0001958	0001998	0002036	0002073	0002109	0002144	0002177	0002210	0002241	0002272	0002302	0002331	0002359	0002387	0002414	0002440	0002465	0002489	0002512	0002534	0002556	0002577			
For finding depth Reciprocal of depth For finding breadth Do. area, contents, and weight Do. deflection	...	...	...	5175	6521	7465	8216	8781	9113	9431	9208	9423	9618	9815	1000	1017	1036	1052	1068	1084	1100	1115	1129	1144	1158	1171	1185	1248	1304	1356	1405	1450	1493	9801			
				1932	1533	1340	1217	1179	1145	1115	1088	1063	1040	1019	9994	9827	9661	9505	9358	9219	9089	8968	8852	8741	8635	8533	8434	8338	8244	8151	8060	7971	7883	7796			
				2927	1844	1407	1162	1090	1053	1021	1000	9771	9542	9313	9084	8855	8626	8397	8168	7939	7710	7481	7252	7023	6794	6565	6336	6107	5878	5649	5420	5191	4962	4733			
				9471	7515	6561	5954	5767	5602	5454	5320	5199	5088	4986	4893	4809	4734	4664	4599	4537	4477	4419	4363	4309	4256	4204	4153	4103	4054	4006	3959	3913	3867				
To deflect	L	40	1020	0001040	0001311	0001501	0001652	0																													

APPENDIX No. I.

On "Indian Timber Trees" by Colonel A. M. Lang.

Extract from "Professional Papers on Indian Engineering," No. XL, Vol. I, Second Series, 1872.

THE following lists contain the names of the most important trees in India, deserving the attention of the Engineer, either as furnishing timber to the carpenter and builder, wood for ornamental turnery, fuel for brick-burning, sleepers for railways, or material for other purposes connected with engineering works. A work of this description is of course no place for *complete* lists of all forest and other trees, and for botanical descriptions, which could not be given within the limits of a few pages, or even of a single volume.

For fuller details on such subjects, works specially devoted to Botany, Forestry, &c., must be consulted; and Balfour's "Timber Trees of India," Cleghorn's "Forests and Gardens of South India," Skinner's "Indian and Burma Timbers," may be advantageously referred to by those interested in Indian trees.

But a brief list of the most important Indian trees, with co-efficients of weight, elasticity, &c., will be useful to every Engineer in the country, and may appropriately be embodied for reference in this work.

It will be observed that the first list contains the *botanical* names, which only are of real value and precise application. *Local* names are in general very vague and not to be depended upon; nor are they of any use beyond the limits of restricted areas. The same tree will be known by many different names over a tract of a few hundred square miles, and it would tax the best memory to retain all the Indian local names of only one or two trees, and correctly apply them to their own proper localities. Again, one local name may in one district refer to one tree and in another district to a perfectly distinct plant. Thus the well-known name "deodar" is applied in Cashmere, Huzara, Gurhwal, and Kumaon to the *Cedrus deodara*: in closely adjacent districts (Koolloo and Kunawur), to *Cupressus torulosa*; and in another neighbouring tract (Chumba), to *Juniperus excelsa*. The botanical name on the contrary has a precise application to one species of plant alone, and this not only in one country, but among all lands enjoying European civilization. Local names, however, are of course useful, and should be acquired by an Engineer in any district in which he may be employed. A list of a few such names follows the first "botanical" list; but it must be remembered that in many cases the identification of local names is very uncertain. *English* names are included in the "local" list, although few (so called) "English" names of Indian trees exist; and in their case also there is great want of precision. For example "poon" and "ebony" are terms loosely applied to a large number of trees of many different "species," and even "orders," and as names serving any useful purpose of precise identification are really valueless.

The numbers denoting weight, cohesive strength, &c., have been for the most part taken from the late Conductor Skinner's useful work on "Indian and Burman Timbers." The *precise* meaning of each separate expression in these formulæ should be carefully realized before using the formula.*

W denotes the weight in *lbs.* of a cubic foot of *seasoned* wood.

E_d is the co-efficient of *elasticity* as involved in Barlow's formula:

$$E_d = \frac{L^3 W}{bd^3 \delta}$$

where E_d is a constant for each kind of wood, derived from experiment, and recorded in tables: L length in *feet*, b breadth and d depth both in *inches*, of a beam supported at the ends, and carrying at *centre* a weight W, in *lbs.*, δ being the deflection at the centre in *inches* (say for timber $\frac{1}{480}$ of the clear bearing).

Note.—These lists and remarks having just been written for incorporation in the section on Timber in the new (3rd) edition of the 1st volume of the Roorkee Treatise on Civil Engineering, and being still in type, the opportunity has been taken of publishing them also in the Professional Papers, as including a table of useful data for calculations on strength of different timbers in engineering structures. [Ed.]

* In using this value of E_d it should be borne in mind that the E (= Modulus of Elasticity) of Rankine's and Stoney's tables (which coincides also with F of Molesworth's elasticity tables) is 432 E_d of this formula, while Barlow uses two separate values of E (Elasticity); in his first tables the $E = 1728 E_d$ and in the second tables his $E = 54 E_d$.

The modulus of rupture (*f*) of Rankine's tables is = 18p of these tables, while in Molesworth's tables the co-efficient of transverse strength is 3p.

With these corrections, the values given in the tables alluded to can be used in these formulæ and comparisons instituted between the values of the English and other woods entered in those tables, and the values for Indian woods herein given.

f_t is the constant for each wood denoting the direct cohesion in lbs. per square inch and applicable to the formula,

$$P = Af_t$$

where P is the weight in lbs., which would tear asunder a piece of timber whose transverse section has an area of A square inches.

p is the constant of strength in lbs. for timbers subjected to cross strain and is applicable to the formula

$$P = \frac{bd^2}{L} p.$$

Where P is the weight in lbs. at the centre, which would break a scantling supported at the ends having a clear bearing in feet = L , and a breadth = b , and depth = d both in inches.

These equations are constantly in use, as explained in the section on "Strength of Materials" in the Roorkee Treatise on Civil Engineering and the numbers given will be found useful for reference. Where more than one number is given for the same coefficient, it will be understood that these are the results of different sets of experiments carried out at different times and places by different persons. In fact the same species of tree will furnish timber of very different quality, in different regions, and even in different parts of the same region, a fact which explains the extraordinary diversity in the statements and opinions recorded by different competent and reliable observers: one authority describing a tree as lofty and furnishing large scantlings of fine timber, another alluding to it as a small tree supplying no timber of any size or use. So well known and valuable a tree as the *deodar* will furnish an imperishable timber of immense scantling if grown on some bleak northern granite slope of the inner Himalaya, while a comparatively soft and inferior wood is produced by the rapidly grown trees of moister forests on the lower slopes nearer the plains. It is advisable, therefore, for the Engineer to ascertain for himself the quality of each description of timber in the actual locality in which he himself is employed; to make experiments to determine its strength, &c., and be careful to utilize each sort properly; not to waste on some temporary structure a timber which may be a source of great value for some special purpose, while perhaps an inferior wood of no durability is being introduced in some important permanent building. As an example of this, Dr. Cleghorn relates how a small bridge, the total estimate of which was Rs. 250, was constructed of *poon* spars, which while unsuited for this purpose would have realized a very large sum for the dockyards, where this timber is invaluable.

It must be remembered that the Engineer is required not only to know the trees available in his district for providing timber, &c., for the purposes above indicated, but he may also have to plant *avenues* along roads and canals, and should acquaint himself with the trees best suited for such purposes, having regard to the nature of the soil, the amount of humidity, &c. In Northern India the best avenue trees having green shady foliage almost throughout the year are Nos. 4, 7, 18, 43, 54, 85, 86, 116, and 117 of the following list. Where the usual rainfall is 25 inches, these trees will thrive with the aid of rain only after having been raised in nurseries and transplanted at the commencement of the summer rains to their positions at the road side (where a "thala" should be prepared for each tree). Where, however, the rainfall averages only 20 inches, it would be difficult to grow avenues of such trees without artificial irrigation, but the "keekar" might be successfully raised from seed sown in trenches where the trees are meant to remain.

In general avenue trees should be raised in small nurseries, where the ground should be broken up to 15 or 18 inches in depth and improved with leaf manure, the nursery being furnished with a well if canal irrigation is not available.

LIST OF THE PRINCIPAL TREES IN INDIA.

N.B.—Trees marked * grow within 50 miles of Roorkee, N. W. P., either indigenous or introduced.

No.	W	Ed	f_t	p	
1					ABIES SMITHIANA. (Coniferae).
					A lofty spruce fir of the N. W. Himalaya, dark and sombre, yet graceful with its symmetrical form and pendulous habit. It furnishes a white wood, easily split into planks; but not esteemed as either strong or durable. It is used as 'shingle' for roof coverings.
2					ACACIA ARABICA.* Leguminosae.
	54	4186 4111	16815	884 876	This well known, yellow flowered, "babool" tree is widely distributed. It grows rapidly, requiring no water, and thriving on poor soil, dry arid plains, black cotton soil, &c. It seldom attains a height of 40 feet or 4 feet in girth; its wood is close-grained and tough, of a pale red color inclining to brown. It can never be had of large size and is generally crooked. Used for spokes, naves, and felloes of wheels, ploughshares, tent pegs.
3					ACACIA CATECHU.*
	56 to 60				A widely distributed tree, with a heavy, close-grained, and brownish red wood, of great strength and durability: employed for posts and uprights of houses, spear and sword handles, ploughs, pins, and treenails of cart-wheels. But the tree is rarely available for timber, being used for the extraction of <i>catechu</i> .
4					ACACIA ELATA.*
	39	2926	9518	695	A handsome lofty tree, suitable for avenues, and furnishing logs 20 to 30 feet long and from 5 to 6 feet in girth. Wood red, hard, strong, and very durable. Used in posts for buildings and in cabinet work.
5					ACACIA LEUCOPHLEA.
	55	4086	16288	861	This very thorny, white barked "keekar" is found in most parts of India and its timber in characteristics much resembles that of <i>A. Arabica</i> , and is used for the same purposes.
6					ACACIA MODESTA.*
					The <i>phulahi</i> is a common, small, and characteristic tree of many parts of the Punjab (as the Jullundur and Hoshiarpore districts). It is well worthy of cultivation for timber in dry sandy tracts of country, and furnishes very hard and tough timber, fitted for making mills, &c.
7					ACACIA SPECIOSA.*
	55	3502 3532		793 532	The 'sirris' is a common tree throughout India, and with its rapid growth, its large head of handsome foliage and sweet scented flowers, is a good avenue tree. It grows to 40 or 50 feet in height and 5 to 6 feet in girth: the wood is said by some writers to be hard, strong, and durable, never warping or cracking, and to be used by the Natives of South India for naves of wheels, pestles and mortars, and for many other purposes; but in Northern India it is held to be brittle, and fit only for such purposes as box planks and for firewood.
8					ACACIA STIPULATA.
	50	4474	21416	823	This unarmed, pink-flowered acacia, one of the largest of the genus, is found from Dehra Dhoon to Travancore, and in Assam and Burma. It furnishes large, strong, compact, stiff, fibrous, coarse-grained, reddish-brown timber, well suited for wheel naves, furniture, and house-building.
9					ADENANTHERA PAVONINA. (Leguminosae)
	56 55	3103	17846	863 1060	A large and handsome tree found in most of the forests of India and Burma, though the timber does not enter the market in large quantities. The wood is strong, but not stiff; hard and durable, tolerably close and even-grained, and stands a good polish. When fresh cut it is of beautiful red coral colour, with a fragrance somewhat resembling "sandal" wood: after exposure it becomes purple, like rose wood. It is used sometimes as sandal wood, and is adapted for cabinet-making purposes.
10					AILANTHUS EXCELSA. (Simarubaceae).
					This tree grows in Southern India, and is found also in Oudh and other parts of Northern India, apparently as an introduced tree. It is a remarkably rapidly growing tree and consequently, though useful for avenues, &c., where shade-giving trees are required to grow quickly, it does not furnish timber of any value. The wood is white, light and not durable; and is used for scabbards, &c.
11					ALBIZZIA ELATA. (Leguminosae).
	42 to 55				Abundant on the banks of rivers in the Burmese plains. It is used by the Burmese for bridges and house posts: it has a large proportion of sap-wood, but the heartwood is hard and durable: and in Dr. Brandis's opinion, the wood may eventually become a valuable article of trade.
12					ALBIZZIA STIPULATA.
	66				Grows in forests on elevated ground in Burma; it has beautifully streaked brown heartwood, which is much prized for cart wheels and bells for cattle.
13					ALBIZZIA sp.
	46	4123	19263	855	"Kokoh" is the Burmese name for an <i>Albizzia</i> , the wood of which is very much valued by the Natives for cart wheels, oil presses, and canoes. It is a lofty tree, often having 60 feet of trunk before the first branch is thrown off.
14					ARTOCARPUS HIRSUTA. (Artocarpaceae).
	40	3905	15070	744	This large, handsome, shady tree grows in Burma and South-east India. It yields the 'anjely' wood of commerce, especially esteemed as a timber bearing submersion in water. It is durable, and is much sought after for dockyards as second only to teak for ship-building: it is also used for house-building, canoes, &c.
15					ARTOCARPUS INTEGRIFOLIA.*
	44	4030	16420	788	The common 'jack fruit' tree is of rapid growth and reaches a very large size. It is found all over India, and is esteemed both for its fruit and timber, and with its abundant dark foliage and numerous pendent fruit is a handsome object. The wood when dry is brittle, and has a coarse and crooked grain. It is, however, suitable for some kinds of house carpentry and joinery; tables, musical instruments, cabinet, and marquetry work, &c. The wood when first cut is yellow, afterwards changing to various shades of brown.
16					ARTOCARPUS LACOOCHA.*
	40				The 'monkey jack' with its orange coloured fruit is found usually as a cultivated plant near houses in India and Burma. The wood is used in the latter country for canoes: the fruit is eaten, and a yellow dye is obtained from the root.

No.	W	Ed	ft	p
17	ARTOCARPUS MOLLIS.	An immense tree on the hills of British Burma, having an average length of trunk to the first branch of 80 feet and girth of 12 feet, 6 feet above ground. The timber is used for canoes and cart wheels.		
	30			
18	AZADARACHTA INDICA.* (Meliaceae).	The beautiful and well-known "neem" tree is common throughout India and Burma, and is much esteemed for ornament and shade. It grows in the stoniest soil. The wood is hard, fibrous, and durable, except from attacks of insects; is of a reddish brown colour; and is used by the Natives for agricultural and building purposes. It is difficult to work, but is worthy of attention for ornamental woodwork. Long beams are seldom obtainable; but the short thick planks are in much request for doors and door frames of Native houses on account of the fragrant odour of the wood.		
	50 3183 17450 720	2672	752	
19	BAMBUSA.* (Graminaceae).	There are many distinct species of bamboo, all of which are applied to numerous useful purposes: bridge building, scaffolding, ladders, water-pipes, rafts, roofing, chairs, beds, &c. They are of all sizes up to 60 feet in length and 8 inches diameter. The bamboo is the most generally useful of all the vegetable products of India, and experiments seem to show that it is stronger than any other Indian wood. It is <i>Endogenous</i> , being in reality a gigantic grass.		
	(Plains) 2801	686		
	(Hills) 5735	970		
20	BARRINGTONIA ACUTANGULA. (Myrtaceae).	A large tree common to India generally and Burma; 30 feet high; 4 feet in girth; flowers red. The wood of a beautifully red colour, tough and strong, with a fine grain and susceptible of good polish. It is used in making carts, and is in great request by cabinet-makers.		
	56 4006 19560 863			
21	BARRINGTONIA RACEMOSA.	This tree is a Native of Southern India, the Moluccas, &c., and when in blossom is showy with its large rose-coloured flowers. The wood is lighter coloured and close-grained, but of less strength than that of the last named species. It is used for house-building and cart-framing, and has been employed for railway sleepers.		
	56 3845 17705 819			
22	BASSIA LATIFOLIA.* (Sapotaceae).	The "mahwah," a well known Indian tree, is in most districts preserved for its large fleshy flowers which are eaten and used in distilling arrack. The wood is, however, sometimes used for doors and windows and furniture; but it is said to be eagerly devoured by white-ants.		
	66 3420 20070 760			
23	BASSIA LONGIFOLIA.	A common tree in Southern and Central India, esteemed for its edible flower and fruit, and the oil extracted from its seeds. For these reasons it is not commonly considered a timber tree, though in Malabar, where it attains a large size, it is used for spars, and is considered nearly equal to teak though smaller.		
	60 3174 15070 730			
24	BAUHINIA VARIEGATA.* (Leguminosae).	This and other species of the genus are valuable, not for their timber, but as ornamental trees for avenues, &c., having beautiful conspicuous flowers: the centre wood is hard and dark like ebony, but seldom large enough for building purposes.		
		Some species of Bauhinia are scandent plants; and among the largest of these is the "elephant creeper" (a name applied also to <i>Argyreia nervosa</i>), which destroys hundreds of valuable timber trees in the sal forests of Northern India, where one of the most arduous duties of the forest department is the eradication of these gigantic creepers whose cable like stems form festoons from tree to tree.		
		'Trincomallie' wood is indigenous to Ceylon, whence large quantities are annually imported into India; but the tree has also been introduced into South India. It is the most valuable wood in Ceylon for naval purposes: and furnishes the material of the Madras masoola boats: it is considered the best wood for capstan bars, cross trees, and fishes for masts. It is light, strong and flexible, and takes the place of <i>ash</i> in Southern India for shafts, helms, &c.		
25	BAUHINIA VAHLI.			
26	BERRYIA AMMONILLA. (Tiliaceae).			
	50 3836 26704 784			
27	BETULA BHOJPUTRA.	This is best known of the Himalayan birches, and is valuable for its abundant loose bark used as paper, and for lining baskets, hookah tubes, &c.; also as a layer over the planking for roofs to receive the tiles or terrace in the Native houses in Tibet, &c.		
28	BIGNONIA CHELONOIDES. (Bignoniaceae).	This tree with its large, fragrant, brownish orange coloured flowers is considered sacred by the Hindus, and is consequently not largely available as timber. The wood is highly coloured, orange yellow, hard and durable: a good fancy wood and suitable for house-building. It is found in Southern India and Assam.		
	48 2804 16657 642			
29	BIGNONIA STIPULATA.	A flowering tree of the Tenasserim forests which furnishes logs 18 feet in length and 4 feet in girth, with strong, fibrous, elastic timber resembling teak, used in house-building and for bows and spear handles. This is one of the strongest, densest, and most valuable of the Burman woods.		
	64 5033 28998 1386			
30	BOMBAX HEPTAPHYLLUM.* (Bombaceae).	The large and stately red "cotton" tree is widely distributed throughout India and Burma. Its light loose-grained wood is valueless as timber, but is extensively used for packing cases, tea chests, and camel trunks: and as it does not rot in water, it is useful for stakes in canal banks, &c. It is a rapidly growing tree, and long planks 3 feet in width can be obtained from old trees.		
	2225 6951 678			
31	BORASSUS FLABELLIFORMIS. (Palmaceae).	The "Palmyra palm" is inferior only to the date and cocoanut palms to the Natives of Asia. The sap furnishes toddy, the seeds are eaten, the leaves are used for thatching, mats, baskets, and for writing upon; while the timber, which is very durable and of great strength to sustain cross strain, is used for rafters, joists and battens. The trees have however to attain a considerable age before they are fit for timber.		
	65 4904 11898 944			

No.	W	Ed	ft	p
32	BRIEDELIA SPINOSA. (Euphorbiaceae).	A large tree of Central and Southern India, with strong, tough durable, close-grained wood, of a copper colour, which, however, is not easily worked. It is employed by the Natives for cart-building and house beams, and is also used for railway sleepers. It lasts well under water, and is consequently used for well curbs.		
	60 4132 14801 892			
33	BUTEA FRONDOSA.* (Leguminosae).	The <i>dhak</i> tree, with its brilliant scarlet blossoms, is widely distributed throughout India, and often forms large tracts of low forest. The wood is generally small or gnarled, and used only for firewood. In Guzerat, however, it is extensively used for house purposes, and deemed durable and strong. The flowers give a bright yellow dye.		
34	BUXUS NEPALENSIS. (Euphorbiaceae).	The Himalayan box, which is found in the North-west Himalayas, but nowhere abundantly, furnishes a very valuable wood for wood engraving, but not equal in closeness and grain, or hardness to "Turkey" or European box. It can, however, be used for all but the finest wood engraving, and is largely employed for this purpose at the Thomason C. E. College at Roorkee.		
35	BYTTNERIA SP. (Byttneriaceae).	This tree is abundant in Tenasserim and furnishes a wood of great elasticity and strength, invaluable for gun carriages. It is used by the Burmese for axles, cart poles, and spear handles.		
	63 4284 26571 1012			
36	CÆSALPINIA SAPPAN. (Leguminosae).	This tree is widely distributed through South-eastern Asia and is an important article of commerce; but from its value as a dye-wood it is not available as timber, though it is admirably adapted for ornamental work, being of a beautiful 'flame' colour with a smooth glassy surface, easily worked, and neither warping nor cracking.		
	60 4790 22578 1540			
37	CALAMUS. (Palmaceae).	There are many species of this genus, furnishing the rattan canes of commerce which are used for "caning" chairs, light carriages, &c. To the Engineer they furnish materials for suspension bridges of considerable span: the Natives of the Khasia hills make single spans of 300 feet with these strong and flexible canes.		
38	CALOPHYLLUM AUGUSTIFOLIUM. (Guttiferae).	This is one of the trees furnishing the valuable 'poon' spars used in ship-building. The trees are becoming scarce on the Malabar Ghâts and should be conserved. Drs. Roxburgh, Gibson, and Cleghorn concur in stating that <i>C. Augustifolium</i> furnishes the <i>poon</i> spars of commerce; but <i>C. Inophyllum</i> also, as well as <i>Calysaccion augustifolia</i> , <i>Dillenia pentagyna</i> , and <i>Sterculia fatida</i> also furnish timber often termed <i>poon</i> .		
	45 2944 15864 612			
39	CALOPHYLLUM LONGIFOLIUM.	A tree of Pegu and Moulmein, furnishing a red wood excellent for masts, helms, &c., and also (when well cleaned and polished) for furniture, but it does not appear to be abundant. The timber of this tree is sometimes termed "red poon."		
	45 3491 16388 546			
40	CAREYA ARBOREA.* (Barringtoniaceae).	This tree grows in most parts of India of a good size and furnishes a tenacious and durable wood which admits of a fine polish. It does not, however, appear to be much used as timber except in Pegu, where it grows to a very large size, and is the chief material of which the carts of the country are made, and the red wood is esteemed equivalent to mahogany. It is useful as a shady avenue tree.		
	50 3255 14803 870	56	672	
41	CASUARINA MURICATA.* (Casuarinaceae).	This fir-like tree, imported from Tenasserim, is common now in most parts of India in avenues, gardens, &c. It thrives best in sandy tracts especially near the sea. It yields a strong, fibrous and stiff timber of a reddish brown colour. It grows with great rapidity, and is admirably fitted for stakes in canals, &c.		
	55 4474 20887 920			
42	CATHARTOCARPUS FISTULA.* (Leguminosae).	This is an ornamental tree for avenues and gardens, scarcely to be surpassed in beauty when covered with scented masses of yellow pendulous blossom. It is found all over Southern Asia, but generally as a small tree, whose close-grained, mottled, dark brown wood is suited for furniture. In Malabar, however, it grows large enough to be used for spars of Native boats.		
	41 3153 17705 846			
43	CEDRELA TOONA.* (Cedrelaceae).	The "toon" is a valuable tree found throughout India and yields a wood extensively used by furniture and cabinet-makers, which though not strong, is light, aromatic, close-grained, beautifully veined, easily worked, and susceptible of a high polish.		
	31 2684 9000 560	3568		
44	CEDRUS DEODARA. (Coniferae).	This handsome tree of the North-west Himalaya furnishes a fragrant, almost imperishable, timber of great value in roof and bridge building and for railway sleepers. It is considered to be identical with the cedar of Lebanon. It is the most valuable timber of the Himalayas, where it grows in large forests. The appearance of the tree and value of the timber vary much with the soil and aspect of the place where it is grown.		
	3565	456		
	3205	586		
	3925	517		
		655		
45	CHICKRASSIA TABULARIS. (Cedrelaceae).	This is one of the trees named in commerce " <i>Chittagong</i> " wood though occurring also in Burma, Southern India, and Eastern Bengal. The wood resembles "toon" in appearance and aroma, but is more strong and tough, though very liable to warp; it is used as 'mahogany' by cabinet-makers.		
	42 2876 9948 614			
46	CHLOROXYLON SWIETENIA. (Cedrelaceae).	This tree of Southern India and Ceylon produces a beautiful yellow wood somewhat resembling 'box' and known as <i>Satin wood</i> : it is well adapted for ornamental decoration, and for picture frames is nearly equal to American maple. Logs up to 18 feet long and 6 feet in girth are obtainable in Madras. It is a hard and durable wood, used for posts and rafters, agricultural implements, and wheel naves.		
	60 4163 11369 870			
47	COCOS NUCIFERA. (Palmaceae).	The "cocoanut palm," widely distributed through Southern India and the Eastern Archipelago, is one of the most valuable of trees, chiefly		

No.	W	Ed	ft	p
70	3605	9150	608	
48	CONNARUS SPECIOSA. (Connaraceae).			
49	CONOCARPUS ACUMINATUS. (Combretaceae).			
59	4352	20623	880	
50	CONOCARPUS LATIFOLIUS.*			
65	5033	21155	1220	
51	CUPRESSUS TORULOSA. (Coniferae).			
52	DALBERGIA LATIFOLIA. (Leguminosae).			
50	4053	20283	912	
53	DALBERGIA Oojeinensis.*			
54	DALBERGIA Sissoo.*			
50	4022	21257	807	
	3516	12072	706	
55	DILLENIA PENTAGYNA. (Dilleniaceae).			
70	3650	17053	907	
56	DILLENIA SPECIOSA.*			
45	3355	12691	721	
57	DIOSPYROS EBENUM. (Ebenaceae).			
58	DIOSPYROS HIRUTA.			
60	4296	19830	757	
59	DIOSPYROS MELANOXYLON.			
81	5058	15873	1180	
60	DIOSPYROS TOMENTOSA.			
61	DIPTEROCARPUS ALATUS. (Dipterocarpaceae).			
45	3247	18781	750	
62	DIPTEROCARPUS TURBINATUS.			
45	3355	15070	762	
49			807	
63	EMBLICA OFFICINALIS.* (Euphorbiaceae).			
46	2270	16964	562	
64	ERYTHRINA INDICA.* (Leguminosae).			

esteemed for its nut, but furnishing also a very hard and durable wood fitted for ridge poles, rafters, battens, posts, pipes, boats, &c. It grows from 40 to 100 feet high, and 2 to 4 feet mean girth, and thrives best near the sea.

A large tree plentiful in the Burmese forests, with heavy strong white timber adapted to every purpose of house-building.

A large timber tree of Southern India and Burma, where it reaches a height of 80 feet before the first branch and a girth of 12 feet at 6 feet above ground. The heartwood is reddish brown, hard and durable; used for house and cart-building. If exposed to water it soon decays.

This is an equally large tree as the preceding, but it is more widely distributed, occurring in Northern India and in the Dehra Doon. It furnishes a hard, durable chocolate coloured wood, very strong in sustaining cross strain. In Nagpore 20,000 axle trees are annually made from this wood. It is well suited for carriage shafts.

This is a handsome lofty tree of the North-west Himalaya, but is not at all abundant; and being esteemed as sacred [and termed 'dewadara' (deodar) or "god timber" in some hill States] it is not felled or made generally available as timber, though very well suited for this purpose.

This tree is distributed throughout India, but reaches perfection on the Malabar coast. It is perhaps the most valuable tree of the Madras presidency, furnishing the well known Malabar blackwood. The trunk sometimes measures 15 feet in girth, and planks 4 feet broad are often procurable after the outside white wood has been removed. It is used for all sorts of furniture, and is especially valued in gun carriage manufacture.

A tree 30 feet high, growing in the valleys of the Himalaya, in Oudh, on the Godavery, and in Bombay. The centre timber is dark, of great strength and toughness, especially adapted for cart wheels and ploughs.

There is scarcely a tree in India which deserves more attention than the *sissoo*, taking into account its beauty and uses, and its rapid growth in every soil. It is said to attain perfection in 28 years. It is widely spread through Northern and Central India, and is more used than any tree for avenues along roads and canals, and for planting in cantonments. It furnishes the Bengal Gun-carriage agencies with their best timber, and is the best of all Indian woods for joiner's work, tables, chairs, and furniture.

A stately and valuable forest tree of Southern India and Burma, furnishing some of the *poon* spars of commerce. The wood is used in house and ship-building, being close-grained, tough, durable (even underground), of a reddish brown colour, not easily worked, and subject to warp and crack.

The *chulta* is a large and ornamental tree of India and Burma, with large fragrant white flowers, edible fruit, and light, strong, light brown wood of the same general characteristics with the preceding tree. It is used in house-building and for gun stocks.

The true *ebony* tree grows in Ceylon and Southern India. This heartwood is deep black, the outer wood is white; with advancing age the black wood increases. It is much affected by the weather, so that it is seldom used, except in veneer and delicate and costly cabinet work.

A middle sized tree of Ceylon and Coromandal, furnishing one of the *Calamander* woods of commerce, of a chocolate colour, with black streaks and marks, esteemed for ornamental purposes: scarce and valuable. Obtainable in logs 12 feet long 4 feet in girth.

This is a very large tree of South India and Pegu, furnishing a valuable wood for inlaying and ornamental turnery, the sapwood white, the heartwood even-grained, heavy, close, and black, standing a high polish.

This is the North Indian representative of the *ebony*-producing Southern forms of *Diospyros*, occurring in Northern Bengal, Oudh, &c.; a tall elegant tree, furnishing a hard and heavy black wood. The young trees are extensively felled by the Natives as cart axles, for which they are well suited from their toughness and strength.

A magnificent forest tree of Pegu and the Straits, rising 250 feet in height and 100 feet to the first branch. The timber is excellent for every purpose of house-building, but if exposed to moisture is not durable: it is hard and coarse-grained, with a powerful odour, and of light brown colour. It furnishes *wood oil*.

This is another lofty wood oil tree of Assam and Burma and the Andamans, with a coarse-grained timber of a light brown colour, not easily worked, and not durable. It is used by the Natives for house-building, in sawn planks, which will not stand exposure and moisture.

The tree producing the *myrobalan* fruit is distributed throughout India, furnishing a hard and durable wood, used for gun stocks, furniture boxes, and veneering and turning; it is suitable for well curbs, as it does not decay under water.

A common tree throughout India and Burma, with a profusion of brilliant scarlet blossoms, whence it is called the "coral" tree: it furnishes a soft, white, easily worked wood, being light, but of no strength, and eagerly attacked by white-ants. It is used for scabbards, toys, light boxes, and trays, &c. It grows very quickly from cuttings.

No.	W	Ed	ft	p
65	EUCALYPTUS.* (Myrtaceae).			
66	FERONIA ELEPHANTUM.* (Aurantiaceae).			
50	3248	13909	645	
67	FICUS ELASTICA.* (Moraceae).			
68	FICUS GLOMERATA.*			
40	2113	12691	588	
	2096			
69	FICUS INDICA.*			
36	2876	9157	600	
70	FICUS RELIGIOSA.*			
34	2454	7535	584	
	2371		458	
71	Gmelina arborea.* (Verbenaceae).			
35	2132			
72	(a) GREWIA ELASTICA.* (b) GREWIA TILIIFOLIA. (Tiliaceae).			
34	2876	17450	565	
73	GUATTERIA LONGIFOLIA. (Anonaceae).			
37	2860	14720	547	
74	HARDWICKIA BINATA. (Leguminosae).			
85	4579	12016	942	
75	HERITIERA MINOR. (Sterculiaceae).			
64	3775	29112	816	
	4677		1312	
			925	
76	HOPERA ODORATA. (Dipteraceae).			
58			800	
45	3660	22209	706	
77	INGA LUCIDA.* (Leguminosae).			
78	INGA XYLOCARPA.			
58	4283	16657	836	
79	JUGLANS REGIA. (Juglandaceae).			
80	LAGERSTRAEMIA REGINAE.* (Lythraceae).			
40	3665	15388	637	
41			642	
81	MANGIFERA INDICA. (Terebinthaceae).			
42	3710	9518	632	
	3120	7702	560	

This is not an Indian genus, but many species are now being naturalized in both the hills and plains of India imported from Australia. Sufficient time has not yet elapsed to establish the value of the "*Blue gum*" and other *Eucalypti* when grown in India.

The tall *wood-apple* tree is widely diffused throughout India, both wild and in gardens and groves; the pulp of the large, hard-shelled fruit is eaten; and the bark furnishes a large quantity of clear white gum known as "*East India Gum Arabic*." It has a yellow coloured, hard, and compact wood used by the Natives in house and cart-building and in some places employed as railway sleepers.

The caoutchouc fig tree grows on the hills of Assam and Silhet, but is to be found as an imported tree in other parts of India. The milky juice is extracted by incisions across the bark down to the wood: 50 ozs. of the juice furnish 15 ozs. of caoutchouc.

The *gooler* is a wide-spreading shady tree, producing great numbers of small red figs growing in clusters on the branches. The wood is light, tough, coarse-grained, and brittle. It is used for door panels, and, being very durable under water, for well-curbs.

The well known "*banyan*" or "*bur*" is one of the commonest trees of India. Its wood is brown coloured, light, brittle, and coarse-grained, neither strong nor durable (except under water, for which cause it is used for well curbs). The wood, however, of its pendent aerial roots is strong and tough, and used for yokes, tent poles, &c.

The *peepul* is as widely spread and well known as the *banyan* and with it is planted near temples and tombs, and in sacred groves. The wood is similar in appearance, characteristics and uses to that of the *banyan*.

A large forest tree of Central and Southern India and Burma; a suitable tree for avenues from its size, straightness, and handsome flowers. It has a pale yellow wood, light, easily worked, not shrinking or warping, strong, and durable, especially under water: it is however readily attacked by white-ants: used for furniture, carriage panels, palkees, &c. In Burma used for posts and house-building generally.

In some parts of India these trees are said to reach a large size, but the wood generally is procured in small scantlings, suitable for spear shafts, carriage and dooly poles, bows, and tool handles, for which it is admirably adapted, being light, soft, flexible and fibrous, resembling lance wood or hickory.

This handsome erect tree with beautiful foliage and dark shade is much grown as an ornamental avenue tree in Southern India. The wood is very light and flexible, but is not used except for drum cylinders.

An elegant, tall and erect tree of Central and Southern India, furnishing a red or dark coloured, very hard, very strong and heavy wood, useful for posts, pillars, and piles, and excellent also for ornamental turnery.

This peculiar, gloomy looking tree, known in Bengal as the "*soon-dree*," grows on tracts occasionally inundated by the tides in Tenasserim and the Gangetic Delta (giving their name to the *Soonderbunds*). It is the toughest wood that has been tested in India, and stands without a rival in strength, and is used for piles, naves, felloes, spokes, and carriage shafts and poles. It is, however, a perishable wood, and shrinks much in seasoning.

One of the finest timber trees of British Burma, sometimes reaching 80 feet in height to the first branch and 12 feet in girth, a large boat of 8 feet beam and carrying four tons being sometimes made of a single scooped-out trunk. The wood is close, even grained, of a light brown colour.

A very fine and rapid growing timber tree from Southern India, Burma, Assam, Nepal, &c., growing to a great height, with sweet scented blossoms, and magnificent, shady, foliage; well suited for avenues. The heartwood is black and is termed *iron wood* in Burma.

This valuable timber tree known as the *iron wood* of Arakan is found throughout Southern India and Burma, furnishing a wood of very superior quality, heavy, hard, close-grained, and durable, and of a very dark red colour: it is, however, not easily worked up and resists nails. It is extensively used for bridge-building, posts, piles, &c., and is a good wood for sleepers, lasting (when judiciously selected and thoroughly seasoned) for six years.

The *walnut* is abundant in the villages of the North-west Himalaya and its beautiful wood is used for all sorts of furniture and cabinet work in the bazaars of the hill stations.

This is a most beautiful flowering tree from South India, Burma and Assam, but introduced into the gardens of North India for the beauty of its luxuriant purple blossoms. In Burma it grows to a large tree, and the wood is used more extensively than any other, except teak, for boat, cart, and house-building, and in the Madras gun-carriage manufactory, for felloes, naves, framings of wagons, &c.

The *mango* is generally diffused over all the warmer parts of Asia, and is much esteemed for its fruit. Its woods however, is of inferior quality, coarse and open grained, of a deep gray colour, decaying if exposed to wet, and greedily eaten by white-ants. It is, however, largely used, being plentiful and cheap, for common doors and doorposts, boards

No.	W	Ed	ft	p
82	MELANORHIZA USITATISSIMA. (Anacardiaceae).	61 3016	514	
83	MELIA AZADARACH.* (Meliaceae).	30 2516 14277	596	
84	MICHELIA CHAMPACA.* (Magnoliaceae).	42		
85	MILLINGTONIA HORTENSIS.* (Bignoniaceae).			
86	MIMUSOPS ELENGI.* (Sapotaceae).	61 3653 11369	632	
87	MIMUSOPS HEXANDRA.	70 3948 19036	944	
88	MIMUSOPS INDICA.	48 4296 23824	845	
89	MORINGA PTERYGOSPERMA.* (Moringaceae).			
90	MORUS INDICA.* (Moraceae).			
91	NAUCLEA CADUMBA. (Cinchonaceae).			
92	NAUCLEA CORDIFOLIA.*	42 3052 10431	664	
93	NAUCLEA PARVIFLORA.*	42	400	
94	PHENIX SYLVESTRIS.* (Palmaeae).	39 3313 8356	512	
95	PICEA WEBBIANA. (Coniferae).	88		
96	PINUS EXCELSA.			
97	PINUS LONGIFOLIA.*	4048	609	
98	PONGAMIA GLABRA.* (Leguminosae).	40 3481 11104	686	

and furniture, and also for firewood. It should never be used for beams, as it is liable to snap off short.

The varnish tree of Burma forms large forests in conjunction with teak and sal, and furnishes a dark-red, hard, heavy, close and even-grained and durable (but brittle) timber, useful for helms, sheave blocks, machinery, railway sleepers, &c.

The "Persian Lilac" of India which grows throughout China, India, Syria, &c., is ornamental when in full foliage and covered with sweet scented lilac flowers; but it is deciduous and bare of leaves for many months, showing then only its bunches of yellow 'beads'; so that it is not altogether desirable as an avenue tree, though very much planted for this purpose. The soft, red-coloured, loose textured wood (resembling in appearance cedar) is used only for light furniture.

A fine timber tree with handsome foliage and flowers. In the Dehra Dhon it reaches 16 feet in girth. In Mysore, trees measuring 50 feet in girth, 3 feet above ground level are found, and slabs 6 feet in breadth can be obtained. As the wood takes a beautiful polish, it makes handsome tables; it is of a rich brown colour.

A very handsome tree for avenues; tall and straight, with graceful foliage and fragrant white flowers. It grows very rapidly, but is not long lived, and is easily injured by storms. The bark is soft and spongy; the wood is white, fine and close-grained, but of little use.

This is an ornamental, more than a useful tree, grown in gardens and avenues throughout India and Burma, for the beauty of its foliage and its pink colour, standing a good polish: and is used for cabinet-making purposes and ordinary house-building.

This tree grows in South India and Guzerat and furnishes wood very similar to the last named used for similar purposes, and for instruments, rulers, and other articles of turnery.

This is a valuable tree of South India and Ceylon, with a coarse-grained, but strong fibrous durable wood of a reddish brown colour; used for house-building and for gun stocks.

A handsome tall tree, with shady foliage and of rapid growth. The wood is white and soft, and the scrapings from the root form a good substitute for the horse radish.

This species of mulberry, as well as *Morus multicaulis* and *M. nigra* are common in Northern India; in some parts of the Punjab and Oudh being planted in connection with silk-worm rearing. It is also grown in avenues, for which, however, it is unsuited, being for many months quite bare of leaves. The wood is yellow, close-grained, very tough, and well suited for turning.

A noble ornamental tree of India and Burma, with orange coloured flowers; sometimes, in the latter country, reaching 80 feet in height and 12 feet in girth. It has a hard, deep yellow, loose-grained wood, used for furniture. In the Gwalior bazaars it is the commonest building timber and is much used for rafters on account of cheapness and lightness, but it is obtained there only in small scantlings.

This is also a very large tree, with a soft close even-grained wood resembling in appearance box, but light and more easily worked, and very susceptible to alternations of temperature. It is esteemed as an ornamental wood for cabinet purposes.

A large fine timber tree with a wood of fine grain easily worked; used for flooring planks, packing boxes and cabinet purposes; it is much used by the wood-carvers of Saharunpore.

This wild "date palm" is common all over India and is valued for the 'toddy' extracted from it. The trunks are used for temporary bridges, revetment piling, and water conduits. The wood is brown and cross-grained and not very strong.

The silver fir of the North-west Himalaya grows at high altitudes 8,000 to 12,000 feet, in dark sombre forests and reaches from 100 to 200 feet in height, with very short, straight, lateral branches. The wood is white, soft, easily split, and used as shingle for roofing, but is not generally valued as timber.

A handsome lofty pine, growing at altitudes of 6,000 to 11,000 in the North-west Himalaya, and furnishing a resinous wood much used for flambeaux; it is durable and close-grained; much used for burning charcoal in the hills and also for building.

The long-leaved 'cheer' pine is the first of this genus obtained in ascending the Himalaya, growing from 2,000 to 6,000 feet altitude; and, being common and light, is largely used in house-building. It requires, however, to be protected from the weather, and is suitable for only interior work in houses. It grows well as an imported tree in the plains as low as Meerut.

This tree grows all over India and Burma and is an excellent avenue tree, reaching in good soil a height of 40 feet, with dense dark green shining foliage all the year round, which, however, is apt to be much disfigured by numberless leaf-mining insects 'blotching' the leaves. The wood is light, tough and fibrous, but not easily worked, yellowish brown in colour, not taking a smooth surface. Solid wheels are made from this wood. It is, however, chiefly used as firewood, and its boughs and leaves as manure.

No.	W	Ed	ft	p
99	PROSOPIS SPICIGERA.* (Leguminosae).			
100	PSIDIUM POMIFERUM.* (Myrtaceae).	47 2676 13116	618	
101	PTEROCARPUS DALBER- GIOIDES. (Leguminosae).	56 4180 19036	864	
102	PTEROCARPUS MARUPIUM.	49	934	
		56 4182 19943	868	
103	PTEROCARPUS SANTALINUS.	70 4582 19036	975	
104	PTEROSPERMUM ACERIFO- LIUM.* (Byttneriaceae).			
105	PUTRANJIVA ROXBURGHII.* (Euphorbiaceae).			
106	QUERCUS. (a) Do. INCANA. (b) Do. DILATATA. (c) Do. SEMICARPIFOLIA. (Corylaceae).		(a) 491 (c) 670	
107	RHUS ACUMINATA.			
108	SANTALUM ALBUM. (Santalaceae).	58 3481 19461	874	
109	SAPINDUS EMARGINATUS.* (Sapindaceae).	64 3965 15495	682	
110	SCHLEICHERA TRIJUGA.* (Sapindaceae).			
111	SHOREA OBTUSA. (Dipteraceae).	58 3500 20254	730	
112	SHOREA ROBUSTA.*	55 4209 18243	880	
		4963 11521	769	
113	SONNERATIA APETALA. (Myrtaceae).			
114	SOYMIDA FEBRIFUGA. (Cedrelaceae).	66 3986 15070	1024	
115	STERCULIA FOETIDA. (Sterculiaceae).			

A fine timber tree, well suited for dry, sandy soils and furnishing a strong, hard, tough wood easily worked. It grows in Mysore and Bombay, but thrives especially in Sindh, where it obtains a large size. It is common also in the Jullundur Doab.

The guava is a well known fruit tree of South-eastern Asia. It is a small tree and furnishes a gray, hard, tough, light, very flexible, but not strong wood: which is very close and fine-grained, and easily and smoothly worked, so that it is fitted for wood engraving and for handles of scientific and other instruments.

This large and handsome padauk tree is a native of the Andaman and Burmese forests, and furnishes a red, mahogany-like timber prized by the Natives above all others for cart-wheels and extensively used by Government in the construction of ordnance carriages.

This large and very beautiful tree is widely diffused, and yields one of the most abundant and useful timbers of Southern India, and also the valuable gum kino. The wood is light brown, strong, and very durable, close-grained, but not easily worked; it is extensively used for cart framing and house-building, but should be protected from wet: it is also well fitted for railway sleepers.

The red sandal wood tree grows in the forests of South India. Its wood is sold by weight as a dye wood and exported to England. It is heavy, extremely hard, with a fine grain, and is suitable for turnery, being of a dark red colour and taking a good polish.

A lofty, handsome, shady tree, suited for avenues: from South India, Assam, and Burma. It has a dark brown wood of great value, and as strong as teak; but its durability has not yet been tested.

A large shady timber tree with straight, erect, trunk, and with wood white, close grained, very hard, durable, and suited for turning. It grows along the foot of the Himalaya, and in Oudh, Assam, Sylhet, and South India.

Numerous species of oak are found in the Himalayas, Sylhet, and Malay Peninsula. The three marginally noted form large forests in the North-west Himalaya. *Incana* occurring from 5,000 to 9,000 feet, and *Semacarpifolia* ascending to 12,000 feet. They are lofty trees, 80 to 100 feet in height, and furnish serviceable timber: in Dr. Cleghorn's opinion some of the best timber we have. The wood is heavy and for two years or more after felling will not float; hence it has not found its way to the plains by the rivers, as is the case with the pine woods. *Q. Semicarpifolia* in colour and grain resembles the English oak.

The 'Kukkur' of the North-west Himalaya, furnishes a wood much valued by cabinet-makers for ornamental furniture. Planks 8 x 2½ feet can be obtained from some trees.

This is the true sandal wood and is found abundantly in Mysore. It grows throughout Southern India, Assam, Cochin China, &c., and is sold by weight to be burned as a perfume. It is also valued for making work boxes, and small articles of ornament; and for wardrobe boxes, &c., where its agreeable odour is a preventive against insects.

The soapnut tree is common to India and Burma: a handsome tree 30 feet high, and 4 feet girth, furnishing a hard wood, which is not durable or easily worked, and is liable to crack if exposed; but is used by Natives for posts and door frames, also for fuel. The tree is valued for its nuts or berries used for washing.

A tree of Southern India, producing a red, strong, hard and heavy wood, used for oil-presses, sugar-crushers, and axles. It occurs also in the east of the Punjab. It is a large and common tree in Burma, where excellent solid cart-wheels are formed from it.

The theeya is a Burmese species of sal, producing a heavy and compact wood, closer and darker coloured than ordinary sal, used for making carts, and oil and rice mills.

The sal furnishes the best and most extensively used timber in Northern India, and is unquestionably the most useful known Indian timber for engineering purposes: it is used for roofs and bridges, ship-building and house-building, sleepers, &c. The tree grows in forests in the Terai, extending along the foot of the Himalaya, from the Brahmapootra to the Jumna, and in Burma and Tenasserim. The timber is straight, strong, and durable; but seasons very slowly, and is for many years liable to warp and shrink.

A large and elegant tree of the Gangetic Delta, Bombay, and Rangoon; yields strong, hard, red wood of coarse grain, used in Calcutta for packing cases for beer and wine, and is also adapted for rough house-building purposes.

A large forest tree of Central and Southern India, furnishing a bright red close-grained wood of great strength and durability, preferred above all wood by the Southern India Hindus for the wood-work of their houses. Though not standing well exposure to sun and weather, it never rots under ground or in masonry, and is very well suited for palisades and railway sleepers.

A large tree South of India, Ceylon, and Burma. In the latter country the trunk is 50 feet to the first branch and girth 10 feet at 6 feet from

No.	W	Ed	ft	p
	28	3349	10736	464
116	SYZYGIIUM JAMBOLANUM.* (Myrtaceæ).			
	48	2746	8840	600
117	TAMARINDUS INDICA.* (Leguminosæ).			
	79	3145	20623	864
		2803		816
118	TECTONA GRANDIS.* (Verbenaceæ).			
	45	3978	15467	814
	42		14498	747
				683
119	TERMINALIA ARJUNA. (Combretaceæ).			
	54	4094	16288	820
120	TERMINALIA BELERICA.			
121	TERMINALIA CHEBULA.*			
	32	3108	7563	470
122	TERMINALIA CORIACEA.			
	60	4043	22351	860
123	TERMINALIA GLABRA.			
	55	3905	20085	840
124	TERMINALIA TOMENTOSA.*			
125	THESPESTIA POPULNEA. (Malvaceæ).			
	49	3294	18143	716
126	TREWIA NUDIFLORA.* (Euphorbiaceæ).			
127	ULMUS INTEGRIFOLIA. (Ulmaceæ).			
128	ZIZYPHUS JUJUBA.* (Rhamnaceæ).			
	58	3584	18421	672

VERNACULAR INDEX TO INDIAN TREES.

List of Local Synonyms of the Trees enumerated in the Preceding List.

be. Bengali. *bu.* Burmese. *c.* Canarese. *e.* English. *g.* Gurhwal. *h.* Hindustani. *k.* Kunawuree.
te. Telugu. *ta.* Tamil.

A.		Cork tree, <i>e</i> ...	85	Jambai, <i>c</i> ...	78	Laku chamna, <i>te</i> ...	16
Abju, <i>h</i> ...	20	Cotton tree, <i>e</i> ...	30	Jambo, <i>h</i> ...	78	Leaur, <i>g</i> ...	51
Abnoos, <i>h</i> ...	57	Cuddapah, <i>ta</i> ...	21	Jamoon, <i>h</i> ...	116	Leem, <i>k</i> ...	96
Aceen ...	122			Jarul, <i>h</i> ...	80		
Aglay, <i>ta</i> ...	45	D.		Jeapota, <i>h</i> ...	105	M.	
Aing, <i>bu</i> ...	61	Date palm, <i>e</i> ...	94	Jhund, <i>h</i> ...	99		
Akrot, <i>h k</i> ...	79	Deodar, <i>k</i> ...	51	Jungli badam, <i>be</i> ...	115	Maah, <i>ta</i> ...	81
Am, <i>h</i> ...	81	Deodar, <i>g</i> ...	44			Mahwah, <i>h</i> ...	22
Amlaki, <i>h</i> ...	63	Dhāk, <i>h</i> ...	33	K.		Maljan, <i>h</i> ...	25
Amultas, <i>h</i> ...	42	Dhamin, <i>h</i> ...	72	Kada lipua, <i>ta</i> ...	80	Mamari, <i>te</i> ...	81
Anjili, <i>ta</i> ...	14	Dhamnoo, <i>h</i> ...	72	Kadam, <i>h</i> ...	91	Mango, <i>e</i> ...	81
Aonla, <i>h</i> ...	63	Dhao, <i>h</i> ...	50	Kadhalsna, <i>c</i> ...	14	Manja kadamba, <i>ta</i> ...	92
Arjun, <i>h</i> ...	119	Dhoon Sirris, <i>e</i> ...	4	Kadon kadet, <i>bu</i> ...	48	Mashoay, <i>bu</i> ...	29
Asan, <i>h</i> ...	124	Dhouira, <i>h</i> ...	46	Kadu kai, <i>ta</i> ...	121	Mavena, <i>c</i> ...	81
Asoka, <i>ta</i> ...	73	E.		Kail, <i>k</i> ...	96	Maydi, <i>te</i> ...	68
Atti, <i>ta</i> ...	68	Ebony, <i>e</i> ...	57, 59	Kaim, <i>h</i> ...	93	Mohe ka jhar, <i>h</i> ...	23
Aucha, <i>ta</i> ...	74	Eedjul, <i>h</i> ...	20	Kaith, <i>h</i> ...	66	Mohru, <i>k</i> ...	106(b)
		Eengyeen, <i>bu</i> ...	112	Kaki, <i>c</i> ...	42	Morinda, <i>g</i> ...	95
B.		Eeta, <i>te</i> ...	94	Kala jam, <i>be</i> ...	116	Moolsuree ...	86
Babool, <i>h</i> ...	2	Elm, <i>e</i> ...	127	Kali keekur, <i>d</i> ...	2	Mulberry, <i>e</i> ...	90
Baer, <i>h</i> ...	128	Erool, ...	78	Kamba, <i>h</i> ...	40	Mulsari, <i>g</i> ...	86
Baheera, <i>h</i> ...	120	Eruputtu, <i>ta</i> ...	52	Kanagalu, <i>c</i> ...	55	Muluvenagay, <i>ta</i> ...	32
Baihya, <i>bu</i> ...	50	Eruvalu, <i>ta</i> ...	78	Kanazo, <i>bu</i> ...	75	Mungal, <i>ta</i> ...	19
Baklee, <i>h</i> ...	86	Eyne, <i>h</i> ...	124	Kantul, <i>be</i> ...	15	Muttee, <i>c</i> ...	122
Bakula, <i>be</i> ...	40	F.		Kanyeen, <i>bu</i> ...	61, 62	N.	
Bamboi, <i>bu</i> ...	19	Furrud, <i>h</i> ...	64	Karakaia, <i>te</i> ...	121	Nagee, <i>bu</i> ...	104
Bamboo, <i>e</i> ...	106(a)			Karanj, <i>h</i> ...	98	Narel, <i>h</i> ...	47
Ban, <i>k</i> ...	19	G.		Kasneer, <i>h</i> ...	67	Narikel, <i>be</i> ...	47
Bans, <i>h</i> ...	7	Gandaga, <i>c</i> ...	108	Katuvagi, <i>ta</i> ...	7	Naryeppa, <i>te</i> ...	74
Baugh, <i>c</i> ...	102	Gomar, <i>be</i> ...	71	Kelmung, <i>k</i> ...	44	Nawel, <i>ta</i> ...	116
Bejasal, <i>h</i> ...	37	Googilam, <i>te</i> ...	112	Kelu, <i>k</i> ...	44	Neem, <i>h</i> ...	18
Bët, <i>h</i> ...	26	Gooler, <i>h</i> ...	68	Kerwal, <i>h</i> ...	80	Nellikai, <i>ta</i> ...	63
Bhojputra, <i>te</i> ...	52	Gnooshwoay, <i>bu</i> ...	42	Keekur, <i>h</i> ...	2, 5	Nulla tooma, <i>te</i> ...	2
Billu kurra, <i>ke</i> ...	55	Guava, <i>e</i> ...	100	Khair, <i>h</i> ...	3	O.	
Bititi, <i>c</i> ...	52	Gumber, <i>be</i> ...	71	Khajoor, <i>h</i> ...	94	Oak, <i>e</i> ...	106
Bjooheen, <i>bu</i> ...	52	Gurrapabadam, <i>te</i> ...	115	Kheerne, <i>h</i> ...	87		
Blackwood, <i>e</i> ...	83	Gwaidouk, <i>bu</i> ...	48	Khoomb, <i>h</i> ...	40	P.	
Bokain, <i>h</i> ...	12	Gyo, <i>bu</i> ...	110	Khoura, <i>be</i> ...	118		
Boomaiza, <i>bu</i> ...	34	H.		Kirmi, <i>h</i> ...	87		
Box, <i>e</i> ...	36	Hanee, <i>c</i> ...	101	Kobin, <i>bu</i> ...	110		
Bukkum, <i>h be</i> ...	69	Honay, <i>c</i> ...	102	Kokoh, <i>bu</i> ...	13		
Bur, <i>h</i> ...	69	Horse radish tree, <i>e</i> ...	89	Konda tangedu, <i>te</i> ...	78		
Burgut, <i>h</i> ...	16	Htan, <i>bu</i> ...	31	Koramann, <i>te</i> ...	82		
Burhul, <i>h</i> ...		Htein, <i>bu</i> ...	93	Koon, <i>be</i> ...	110		
		Hulda, <i>h</i> ...	121	Koonkoodoo, <i>te</i> ...	109		
C.		Huldo, <i>h</i> ...	92		38		
Calamander, <i>e</i> ...	58	Hura, <i>h</i> ...	121	Koovai, <i>c</i> ...	110		
Cane, <i>e</i> ...	37	Hurda, ...	121	Koosoom, <i>h</i> ...	110		
Caoutchouc tree, <i>e</i> ...	67	Hyebeen, <i>bu</i> ...	128	Kuchnar, <i>h</i> ...	24		
Casuarina, <i>c</i> ...	41			Kndumb, <i>h</i> ...	91		
Catechu, <i>e</i> ...	3			Kukkur, <i>k</i> ...	107		
Cedar, <i>e</i> ...	44			Kumbala, <i>bu</i> ...	113		
Chandana, <i>be</i> ...	108			Kumbhi, <i>te</i> ...	40		
Chandanam, <i>ta</i> ...	108			Kumhar, <i>h</i> ...	71		
Cheel, <i>k</i> ...	97			Kurroo murdoo, <i>bu</i> ...	123		
Cheer, <i>h</i> ...	97			Kurroo pallay, <i>te</i> ...	105		
Chickrassi, <i>be</i> ...	45			Kurroo vallum, <i>ta</i> ...	2		
Chittagong, <i>e</i> ...	45	I.		Kursoo, <i>k</i> ...	106(c)		
Chulta, <i>be</i> ...	56	Imlee, <i>h</i> ...	117	Kurunj, <i>h</i> ...	98		
Chumpa, <i>h</i> ...	84	Indian-rubber tree, <i>e</i> ...	67	Kussumb, <i>h</i> ...	110		
Chumpaka, <i>be</i> ...	84	Ippie, <i>te</i> ...	22	Kuthbel, <i>h</i> ...	66		
Chumpakamu, <i>te</i> ...	84	Iron wood, <i>e</i> ...	77, 78	Kuthul, <i>h</i> ...	15		
Coccanut palm, <i>e</i> ...	47	J.		Kyaitha, <i>bu</i> ...	20		
Coral tree, <i>e</i> ...	64	Jack, <i>e</i> ...	15	Kywoon, <i>bu</i> ...	118		
Coramundalum, <i>ta</i> ...	58						
				Lakoocha, <i>h</i> ...	16		

Width of floor boards.—For important rooms 4½ inches; in ordinary rooms 7 inches; for common and temporary purposes 9 inches. The narrower the boards the less they shrink. All the boards should be listed or have the sapwood removed from edges. They should be very well seasoned, if not they should be temporarily laid and left a year before being finally laid and nailed down.

849. *Ventilation of floor joists, &c.*—The spaces between the timbers of floors and flat roofs should be well ventilated by air bricks in walls. Ground below a floor should be thoroughly drained and covered in some cases with a layer of lime concrete or with ashes and quicklime.

850. *Weight which floors have usually to sustain (H 36):*—

	Per foot superficial.
Ordinary dwelling-houses should be calculated to sustain, including weight of floor itself	1½ cwt.
Public buildings, lecture-rooms, &c.	1½ "
Warehouses, factories, &c.	2½ to 4 cwt.

Corn in bulk weighs 50lbs. per foot cube. If piled 5½ feet high, will amount to 2½ cwt. per foot superficial.

APPENDIX No. II. DETAILS OF FLOORING BOARDS.

Extract from Part II.

R. E. Aide-Memoire.

Showing three examples of trimming.

FIG. 295.

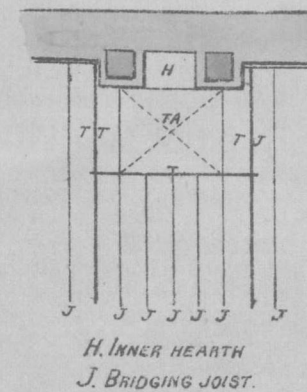


FIG. 296.

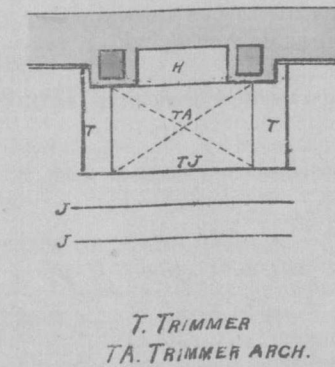


FIG. 297.

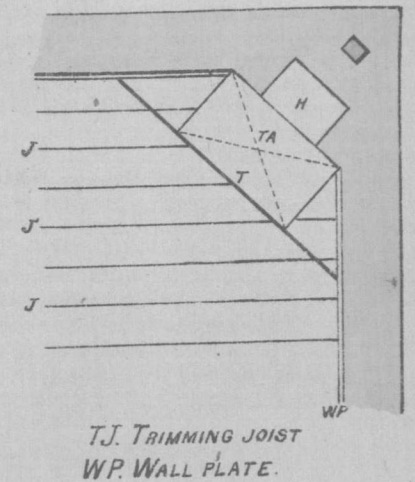


FIG. 298.

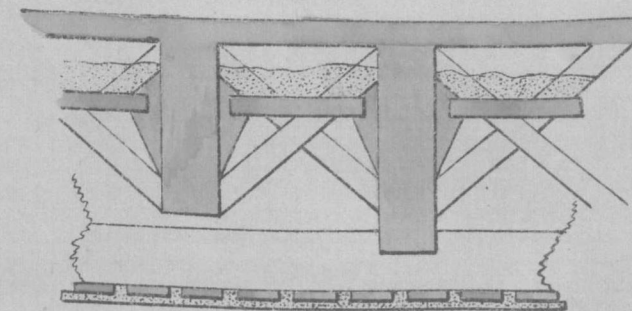


FIG. 299.

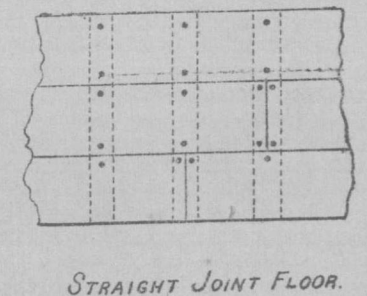
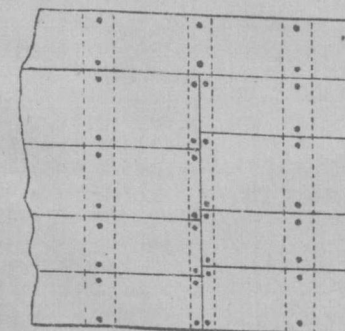
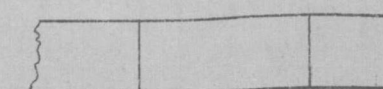


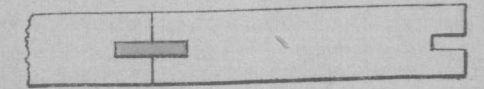
FIG. 300.



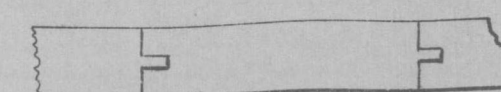
1.



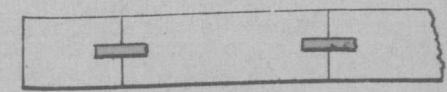
2.



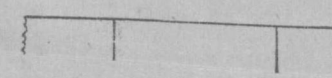
2A.



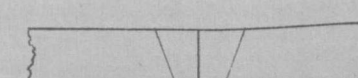
3.



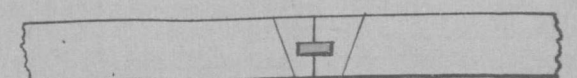
4.



5.



6.



DEFLECTION FORMULÆ.

Addenda to Note A.

If the bearing of timbers on the walls are taken into account, the equations note A will be altered and give a different result for the most economical spacing.

Let A be the bearing of the main beams in the floor, *etc.*, on the walls in feet.

B = bearing of joists on walls in feet.

E_{d_1} = value of E_d in main beams.

E_{d_2} = value of E_d in joists.

C_1 = cost of main beams per c. ft.

C_2 = cost of joists per c. ft.

Then the cubic contents of the main beams will be for the whole floor.

$$\frac{25^{\frac{1}{2}} w^{\frac{1}{2}}}{144} \left\{ \frac{(l \pm s) L^{\frac{3}{2}}}{R^{\frac{1}{2}} s^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} + \frac{2 A L^{\frac{3}{2}} (l \pm s)}{R^{\frac{1}{2}} s^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} \right\}$$

and the cost will be

$$= \frac{L^{\frac{3}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}}}{144 R^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} (L + 2A) \left[\frac{l \pm s}{s^{\frac{1}{2}}} \right] C_1 \dots \dots \dots \text{I.}$$

and the total cubic contents of joists in cubic feet will be

$$(L \pm d) \frac{l s^{\frac{3}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}}}{144 r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}}} + \frac{2 B}{144} \left[\frac{L \pm d}{d} \right] \frac{s^{\frac{3}{2}} d^{\frac{1}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}}}{E_{d_2}^{\frac{1}{2}} r^{\frac{1}{2}}}$$

and the cost will be

$$= \left[\frac{L \pm d}{d} \right] (l + 2B) \frac{d^{\frac{1}{2}} s^{\frac{3}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}} C_2}{144 r^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}}} \dots \dots \dots \text{II.}$$

Then

$$u = \left[\frac{l \pm s}{s^{\frac{1}{2}}} \right] \left[\frac{L + 2A}{144} \right] \frac{L^{\frac{3}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}} C_1}{R^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} + s^{\frac{3}{2}} \left\{ \frac{(L \pm d)}{d} (l + 2B) \frac{d^{\frac{1}{2}} \cdot 25^{\frac{1}{2}} \cdot w^{\frac{1}{2}} C_2}{144 r^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}}} \right\} \dots \dots \dots \text{III.}$$

$$\frac{d u}{d s} = \left[-\frac{l}{2 s^{\frac{3}{2}}} \pm \frac{1}{2 s^{\frac{1}{2}}} \right] \frac{(L + 2A) L^{\frac{3}{2}} 25^{\frac{1}{2}} w^{\frac{1}{2}} C_1}{144 R^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}}} + \frac{3 s^{\frac{1}{2}}}{2} \left\{ \frac{(L \pm d)}{d} (l + 2B) \frac{d^{\frac{1}{2}} \cdot 25^{\frac{1}{2}} \cdot w^{\frac{1}{2}} C_2}{144 r^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}}} \right\} = 0$$

$$\therefore s = \mp \frac{L^{\frac{3}{2}} (L + 2A) d^{\frac{1}{2}} r^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} C_1}{6 (L \pm d) (l + 2B) R^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} C_2}$$

$$\pm \sqrt{\frac{l L^{\frac{3}{2}} (L + 2A) d^{\frac{1}{2}} r^{\frac{1}{2}} E_{d_2}^{\frac{1}{2}} C_1}{3 R^{\frac{1}{2}} E_{d_1}^{\frac{1}{2}} (L \pm d) (l \pm 2B) C_2} + \frac{L^3 d r E_{d_2} (L + 2A)^2 C_1^2}{36 (L \pm d)^2 (l \pm 2B)^2 R E_{d_1} C_2^2}} \dots \dots \dots \text{IV.}$$

This is the general equation: and will have four different values according with $\frac{l \pm s}{s}$ and $\frac{(L \pm d)}{d}$.

If $\frac{l + s}{s}$ is taken, *i.e.*, a main beam placed at each end of the room or platform on which the joists rest: then the joists would have no bearing on the wall and $2B = 0$: $\therefore$ for $\frac{l + s}{s}$

$$s = -\frac{L^3 r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2} (L+2A) C_1}{6 l E_{d_1} R^{\frac{1}{2}} (L \pm d) C_2} \pm \sqrt{\frac{L^3 r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2} (L+2A) C_1}{3 E_{d_1} R^{\frac{1}{2}} (L \pm d) C_2} + \frac{L^3 r d E_{d_2} (L+2A)^2 C_1^2}{36 l^2 E_{d_1} R (L \pm d)^2 C_2^2}} \dots a.$$

and for $\frac{l-s}{s}$

$$s = \frac{L^3 r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2} (L+2A) C_1}{6 R^{\frac{1}{2}} E_{d_1} (L \pm d) (l+2B) C_2} \pm \sqrt{\frac{l L^3 r^{\frac{1}{2}} d^{\frac{1}{2}} E_{d_2} (L+2A) C_1}{3 R^{\frac{1}{2}} E_{d_1} (L \pm d) (l+2B) C_2} + \frac{L^3 d r E_{d_2} (L+2A)^2 C_1^2}{36 R E_{d_1} (L \pm d)^2 (l+2B)^2 C_2^2}} \dots b.$$

Each of the equations *a* and *b* have two values; one for $\left(\frac{L+d}{d}\right)$ and one for $\left(\frac{L-d}{d}\right)$.

By making $A = 0$, and $B = 0$ in Equation IV, it will be seen that it then agrees with Equation 5A₂ of Note A.

In Equation IV, if $R = r \cdot E_{d_1} = E_{d_2} \cdot C_1 = C_2$, $A = 0$, $B = 0$ and taking the mean value of $l \pm s$ and $L \pm d$

Then

$$s = \mp \frac{L^3 d^{\frac{1}{2}}}{6 l} \pm \sqrt{\frac{L^3 d^{\frac{1}{2}}}{3} + \frac{L^3 d}{36 l^2}} \dots c.$$

It might be worth while to test these equations with a numerical example to see how far Table No. II can be relied upon. In doing so we will take $R = r$, $C_1 = C_2$, and $E_{d_1} = E_{d_2}$, or for (*a*).

$$s = -\frac{L^3 d^{\frac{1}{2}} (L+2A)}{6 l (L \pm d)} \pm \sqrt{\frac{L^3 d^{\frac{1}{2}} (L+2A)}{3 (L \pm d)} + \frac{L^3 d (L+2A)^2}{36 l^2 (L \pm d)^2}}$$

Let l or length of room = 50 feet.

L or breadth of room = 25 feet = length of beams between points of support.

d or spacing of joints = 4 feet.

A or bearing of main beams = 1 foot.

Take $L + d$ first.

Then

$$\begin{aligned} s &= -\frac{25^3 \cdot 4^{\frac{1}{2}} \cdot 27}{6 \times 50 \times 29} \pm \sqrt{\frac{25^3 \cdot 4^{\frac{1}{2}} \cdot 27}{3 \times 29} + \frac{25^3 \cdot 4 \times 27^2}{36 \times 50^2 \times 29^2}} \\ s &= -\frac{125 \cdot 2 \cdot 27}{6 \times 50 \times 29} \pm \sqrt{\frac{125 \cdot 2 \cdot 27}{3 \cdot 29} + \frac{15625 \times 4 \times 729}{36 \cdot 2500 \cdot 841}} \\ &= -77586 \pm \sqrt{77586 + 60195} \\ &= -77586 \pm 8842 = 8066 \text{ or } -9617 \dots (1) \end{aligned}$$

Now taking $L-d$ we get

$$\begin{aligned} s &= -\frac{125 \cdot 2 \cdot 27}{6 \cdot 50 \cdot 21} \pm \sqrt{\frac{125 \cdot 2 \cdot 27}{3 \cdot 21} + \left(\frac{125 \cdot 2 \cdot 27}{6 \cdot 50 \cdot 21}\right)^2} \\ &= -10714 \pm \sqrt{107142 + 11474} \\ &= -10714 \pm 1040 = 9328 \text{ or } -11471 \dots (2) \end{aligned}$$

Now taking (Eq. *b*) or $l-s$ and making $B = 1$ also first taking $(L+d)$.

$$\begin{aligned} s &= \frac{L^3 d^{\frac{1}{2}} (L+2A)}{6 \cdot (L+d) (l+2B)} \pm \sqrt{\frac{l L^3 d^{\frac{1}{2}} (L+2A)}{3 (L+d) (l+2B)} + \left(\frac{L^3 d^{\frac{1}{2}} (L+2A)}{6 (L+d) (l+2B)}\right)^2} \\ &= \frac{125 \cdot 2 \cdot 27}{6 \cdot 29 \cdot 52} \pm \sqrt{\frac{50 \cdot 125 \cdot 2 \cdot 27}{3 \cdot 29 \cdot 52} + \left(\frac{125 \cdot 2 \cdot 27}{6 \cdot 29 \cdot 52}\right)^2} \\ &= 746 \pm \sqrt{74602 + 5565} \\ &= 746 \pm 8669 = 9415 \text{ or } -7923 \dots (3) \end{aligned}$$

Now taking $L-d$.

$$\frac{125 \cdot 2 \cdot 27}{6 \cdot 21 \cdot 52} \pm \sqrt{\frac{50 \cdot 125 \cdot 2 \cdot 27}{3 \cdot 21 \cdot 52} + \left(\frac{125 \cdot 2 \cdot 27}{6 \cdot 21 \cdot 52}\right)^2}$$

$$10302 \pm \sqrt{103022 + 10609}$$

$$10302 \pm 1020 = 112302 \text{ or } -917 \dots (4)$$

By taking the mean values of $(l \pm s)$ and $(L \pm d)$ as given in Equation *c*

$$\mp 833 \pm \sqrt{83333 + 6938}$$

$$= \mp 833 \pm 916 = +833 \text{ or } -833$$

Results.

$$\text{For } l+s \text{ and } L+d \dots 8066 \dots (1)$$

$$\text{For } l+s \text{ and } L-d \dots 9328 \dots (2)$$

$$\text{For } l-s \text{ and } L+d \dots 9415 \dots (3)$$

$$\text{For } l-s \text{ and } L-d \dots 11230 \dots (4)$$

Taking results as given in Equation *c*.

$$= 833 \text{ or } -833 \dots (5)$$

As shown in Table No. II.

$$\left. \begin{aligned} \frac{L+d}{d} &= 8.476 \\ \frac{L-d}{d} &= 9.959 \end{aligned} \right\} \text{mean } 9.217 \dots (6)$$

If in equation (*a*) we take the mean of $L \pm d$, i.e.,

$$s = -\frac{L^3 d^{\frac{1}{2}} (L+2A)}{6 l} \pm \sqrt{\frac{L^3 d^{\frac{1}{2}} (L+2A)}{3} + \left(\frac{L^3 d^{\frac{1}{2}} (L+2A)}{6 l}\right)^2}$$

Then

$$\begin{aligned} s &= -\frac{5 \times 2 \times 27}{6 \times 50} \pm \sqrt{\frac{5 \cdot 2 \cdot 27}{3} + \left(\frac{5 \cdot 2 \cdot 27}{6 \cdot 50}\right)^2} \\ &= -9 \pm 9.529 = +8.629 \text{ or } -10.429 \end{aligned}$$

and Equation (*b*) when $B = 1$ foot as before

$$\begin{aligned} &+ \frac{5 \cdot 2 \cdot 27}{6 \times 52} \pm \sqrt{\frac{5 \cdot 50 \cdot 2 \cdot 27}{3 \cdot 52} + \left(\frac{5 \cdot 2 \cdot 27}{6 \cdot 52}\right)^2} \\ &= 8654 \pm \sqrt{8654 + 7482} \\ &= 8654 \pm 9342 = 10207 \text{ or } -84766 \end{aligned}$$

The values for the most economical spacing given in the equation are on the supposition that whole numbers and fractions of beams and joists can be put into the structure; and if such were possible in practice the spacing as given by the equations would be the most economical; but such not being the case, the nearest sub-multiple of the length to the value given in the equation will give the most economical floor. As an example in results (1); it is impossible to space beams 8.066 apart in a 50-foot room; but we could space them 8.33 feet apart,

which will give for $\frac{l+s}{s} = 7$ beams to the floor and 5 for $\frac{l-s}{s}$. We could space them 7.14 feet apart, which will give 8 or 6 beams according to whether $\frac{l+s}{s}$ or $\frac{l-s}{s}$ is used: or we can space them 10 feet apart which will give 6 or 4

beams. Also in the case of $\frac{L+d}{d}$ and $\frac{L-d}{d}$ it would be impossible in practice to space the joists 4 feet apart in a 25-foot room which would give a fraction of a beam over. We can, however, space them $\frac{25}{8} = 3\frac{1}{8}$, $\frac{25}{7} = 3\frac{4}{7}$, $\frac{25}{6} = 4\frac{1}{6}$ or $\frac{25}{5} = 5$

feet. By taking any of these quantities the quantities obtained from equation (a) will be altered, *i.e.*, Results (1) will be altered from 8.066.

For $d = 4\frac{1}{8}$ the number nearest to 4

$$s = -\frac{25^3 \cdot 4\frac{1}{8} \cdot 27}{6 \cdot 50 \cdot 29\frac{1}{8}} \pm \sqrt{\frac{25^3 \cdot 4\frac{1}{8} \cdot 27}{3 \times 29\frac{1}{8}} + \left(\frac{25^3 \cdot 4\frac{1}{8} \cdot 27}{6 \cdot 50 \cdot 29\frac{1}{8}}\right)^2}$$

$$= -78734 \pm \sqrt{78734 + 6199}$$

$$= -787' \pm 8908 = 8.121.$$

The alteration of d from 4' to $4\frac{1}{8}$ ' does not make much difference in the result, and practically none as 8.33' apart is still the spacing that should be allowed in practice. Out of the four different spacings, 8.121' (obtained by making $d = 4\frac{1}{8}$ '), 8.33', 7.14', and 10', the first (which is not admissible in practice) will give the least amount of timber and 8.33', which is the spacing that should be adopted, will give a more economical roof floor, *etc.*, than either 7.14' or 10' spacing.

Although we cannot adopt 8.121' as spacing in a 50-foot length of structure, still we can by Equation III show by a numerical example that it is the most economical, for that equation is true for any value, no limit having been put on $\frac{l \pm s}{s}$ or $\frac{L \pm d}{d}$, and they may be fractional or whole numbers.

If we assume the following data:

w or weight per square foot on structure = 100lbs.

$R = r$ ratio of depth to breadth in main beams and joists = 1.

$E_{ax} = E_{az} = 3900$, being value of Roorkee E_a for Pegu teak.

A = bearing of main beams = 1 foot.

L = length of beams between supports = 25 feet.

l = length of room = 50 feet.

And taking the number of beams as $\frac{l \pm s}{s}$ and joists $\frac{L \pm d}{d}$ respectively,

then B or bearing of joists will = 0.

Then if d or distance apart of joists = $4\frac{1}{8}$ ': then s or the most economical spacing = 8.121'.

If $d = 1$ foot, then $s = 6.159$ feet.

The cubic contents of timber in a structure of 50-feet in length is here given for the different spacings practicable for $d = 4\frac{1}{8}$ ' and $d = 1'$ with the data just mentioned.

Distance apart of main beams. Feet.	Cubic contents in beams in cubic feet.	Cubic contents in joists when $4\frac{1}{8}$ ' apart.	Cubic contents in joists when 1' apart.	Total cubic feet beams and joists, joists $4\frac{1}{8}$ ' apart.	Total cubic feet beams and joists, joists 1' apart.
16.666	306.43	270.21	491.77	576.64	798.20
12.25	331.72	175.52	319.44	507.24	651.16
10'	356.05	125.59	228.60	481.64	584.65
8.333	379.19	95.539	173.88	474.729	558.07
8.121	382.72	91.911	167.28	474.631	550.00
7.142	401.21	75.815	137.98	477.025	539.19
6.25	422.22	62.055	112.94	484.275	535.16
6.159	424.61		109.95		534.56
5.555	442.80	52.005	94.646	494.805	536.946
5.000	461.57	44.401	80.807	505.971	542.377
4.5454	480.08	38.487	70.045	518.487	550.125
4.1666	497.95	33.777	61.474	531.727	559.424
3.846	512.83	29.955	54.517	542.985	567.847

It is evident from these last two spacings, 4.1666' and 3.846' that the joists need not be added for the 4.166 distance apart of joist as the main beams will act as joists.

The spacings 8.121 and 6.159 are the most economical: but are not practicable in a 50-foot length of structure. The spacings 8.33' for a $4\frac{1}{8}$ ' distance apart of joists and 6.25' for the 1 foot distance apart of joists should be adopted. Table No. II gives 6.329' when joists are 1 foot apart and length of beams 25 feet. So it will be readily seen that the table gives results sufficiently near the truth for all practical purposes when $\frac{L \pm d}{d}$ and $\frac{l \pm s}{s}$ are used. For the 4 feet

distance apart of joists the table gives 8.476, whereas the calculation by taking (l) length of room and the bearing of beams on walls into account gives 8.066.

Eq. c gives 6.05' as spacing for joists 1 foot apart.

Eq. c gives 8.40 as spacing for joists $4\frac{1}{8}$ feet apart.

Now suppose the main beams cost twice as much as the joists per cubic foot, *i.e.*, $C_1 = 2$, $C_2 = 1$.

Then the most economical spacing for $d = 4\frac{1}{8}$ ' other data as before will be 11.065 feet.

Here we would have to space the beams either 10 or 12.25 feet apart in a 50-foot room.

The relative values of timber would be

For 8.333 feet spacing of beams = $2 \times 379.19 + 95.539 = 853.919$.

For 10' feet spacing of beams = $2 \times 356.05 + 125.59 = 837.69$.

For 12.25 feet spacing of beams = $2 \times 331.72 + 175.52 = 838.96$.

For 16.666 feet spacing of beams = $2 \times 306.43 + 270.21 = 883.07$.

In this case it would not much matter whether 10 or 12.25 feet spacing is adopted: but 11 feet, which is not admissible in practice, is the most economical as regards value: but not so as regards quantity of timber the spacing 8.121' being the one that will give the least cubic contents.

FORMULÆ AND TABLES
FOR DETERMINING THE SCANTLINGS
OF
BEAMS AND JOISTS
OF ALL TIMBERS
FOR
ENGINEERING PURPOSES

FLOORS, ROOFS, BRIDGE-PLATFORMS, &c., WITH RULES AND ORIGINAL FORMULÆ REGARDING THE MOST ECONOMICAL SPACING OF BEAMS FOR A DOUBLE OR A TRIPLE FRAMED FLOOR, WITH TABLE FOR FACILITATING THE CALCULATION; WITH ORIGINAL FORMULÆ AND REMARKS WHEN JOISTS SHOULD BE USED ONLY INSTEAD OF BEAMS AND JOISTS, AND THE ADVANTAGES OF THE ONE OVER THE OTHER; ALSO GIVING RULES AND ORIGINAL FORMULÆ FOR FINDING THE LOSS SUSTAINED BY USING A SPACING DIFFERENT FROM THE MOST ECONOMICAL SPACING, WITH OTHER INFORMATION, AND EXAMPLES IN THE DEFLECTION AND STRENGTH FORMULÆ; AND THE APPLICABILITY OF THE TABLES AND FORMULÆ TO THE DIFFERENT KINDS OF STRUCTURES. (MANY OF THE FORMULÆ ARE, IT IS BELIEVED, ORIGINAL.)

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APPENDIX
ON
INDIAN TIMBER TREES

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